A PROGRAM FOR MANAGEMENT
1957 . . . . No. 4

MAY 13, 1957

STEEL
The Metalworking Weekly

A PENTON PUBLICATION

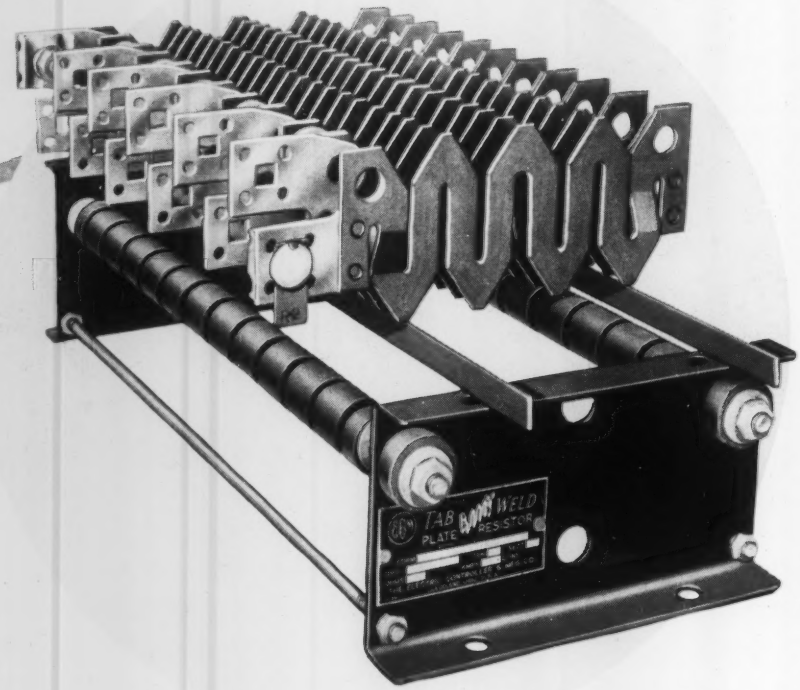
Inventory Management . . . page 109

✔ Hottest Problem: Materials for 1500°F . . . page 120

✔ Uptrend Looms for Reinforcing Steel . . . page 191

CONTENTS — PAGE 5

EC&M Tab-Weld® Resistors are BOLTED and WELDED for Constant Current Path!

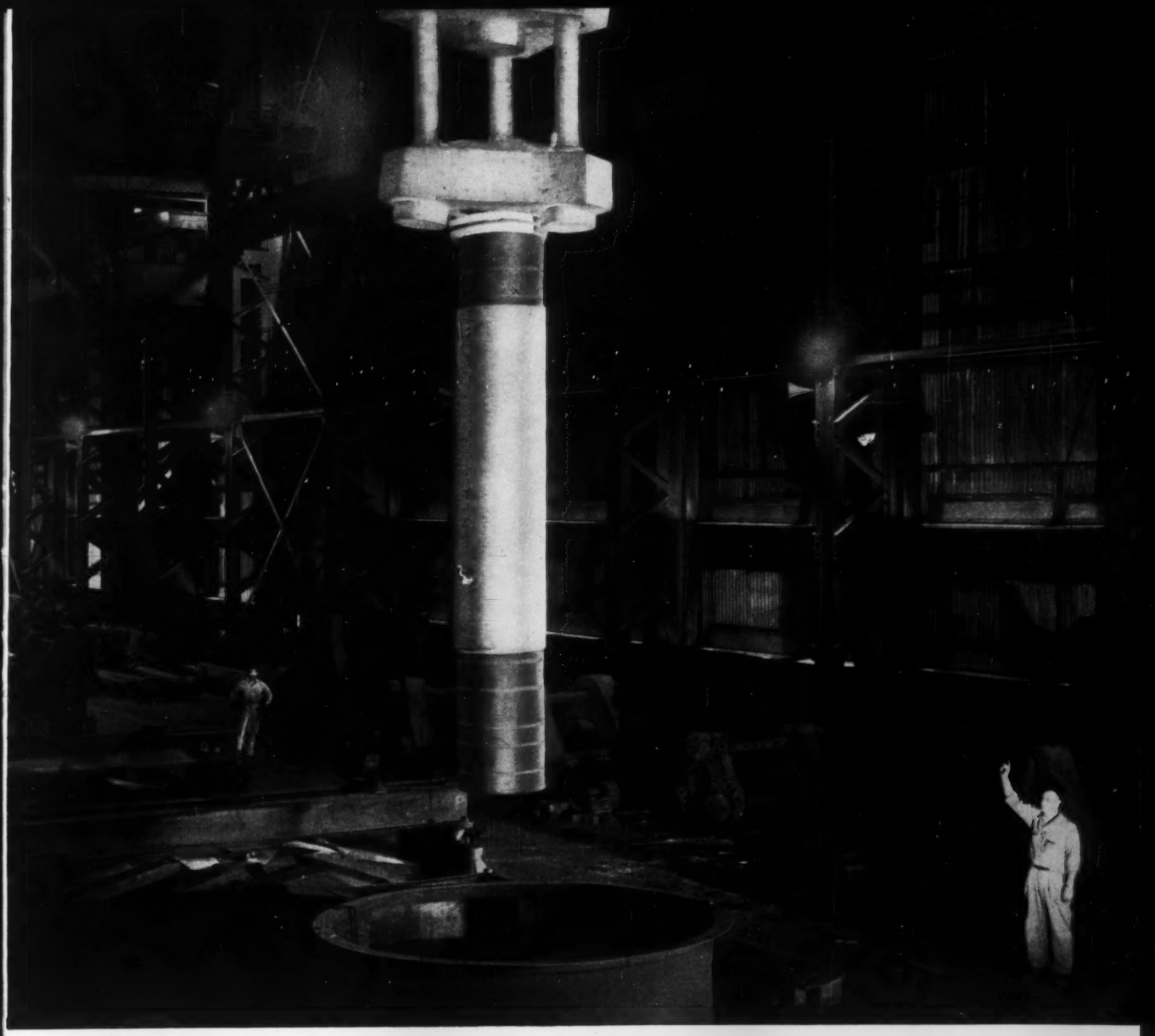


Unlike other resistors, EC&M Tab-Weld Resistors do *not* require periodic tightening of clamping nuts to compensate for loss of pressure caused by alternate heating and cooling. Grids are offset and mating ends are spot welded. Tap-plates are also welded into place at close intervals along the grid assembly...This EC&M construction offers 4 big advantages on heavy duty motor applications: *(1)* stabilized ohmic value *(2)* no burning at grid-eyes or at tap-plates *(3)* easy tap-shifting for best motor performance and *(4)* long life without maintenance!

***Write** for illustrated Bulletin 6715*

THE ELECTRIC CONTROLLER & MFG. CO.
A DIVISION OF THE SQUARE D COMPANY
CLEVELAND 28 • OHIO

8588



12-Ton Roll Poised for a Bath

A moment after this photograph was taken, the big heated forging was lowered into the quenching tank. Temperature of the forging and period of immersion were of course closely controlled; the forging was a steel roll in the making, and every operation had to be handled with the utmost precision.

When finished and shipped from the Bethlehem plant, the roll weighed an even 12 tons. Its overall length was approximately 17 ft; body diameter was 28 in. The purchaser ordered it to his own specifications for use in rolling aluminum.

Rolls like this require the most painstaking care, and at Bethlehem they get it. The strictest metallurgical controls are enforced at every step, beginning with the making of the steel. When a roll leaves our shops, it meets all specifications on size, finish, hardness, down to the last detail.

Bethlehem forged rolls are completely dependable for cold-rolling ferrous sheets and strip; running-down and finishing operations on copper and brass sheets; hot- and cold-rolling aluminum sheets; cold-rolling aluminum foil. Call us when we can be of service; our engineers will gladly cooperate.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

Always, at SKF, you will receive unbiased advice

because

– All four basic types of anti-friction bearings are available from **SKF**.

because

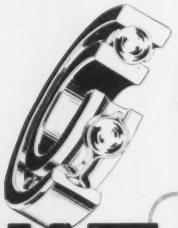
– They offer an extraordinarily wide range of sizes and combinations to meet virtually any requirement.

because

– Their long experience in the widest variety of bearing applications is your assurance of receiving sound recommendations.

because

– Thousands of manufacturers have been using the **SKF** Bearing Advisory Service for many years – always with good results. This dependable service is available to you, too. 7754



SKF

EVERY TYPE—EVERY USE

- *Ball Bearings*
- *Cylindrical Roller Bearings*
- *Spherical Roller Bearings*
- *Tapered Roller Bearings* ("Tyson")

* Reg. U.S. Pat. Off. Tyson Bearing Corporation

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.

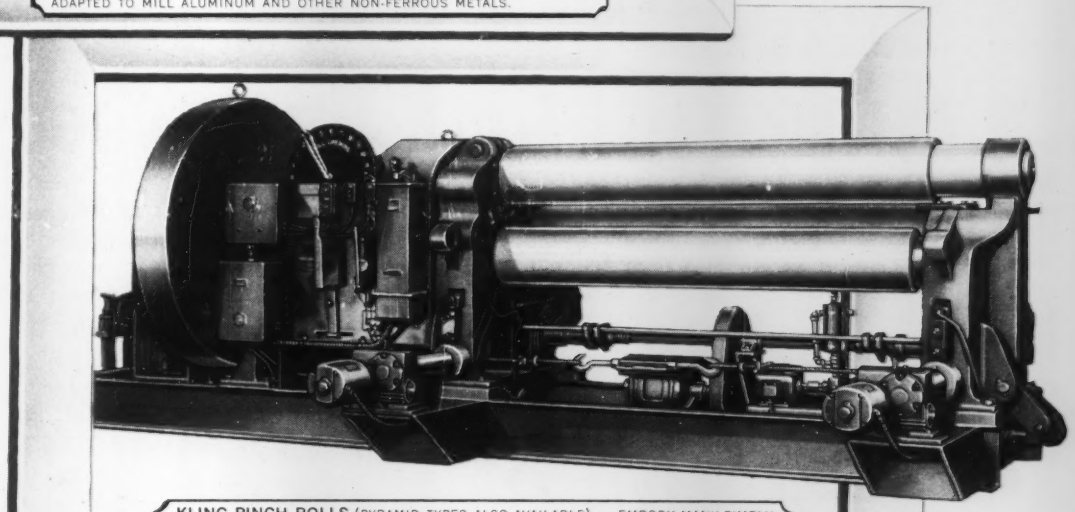
With new Kling machines like these in your production picture you're set to capitalize on

America's Booming Demand

for Road Building Machinery and many other production machines requiring fabrication of structurals, angles, sheet and plate.

KLING MILL-ALL . . . A NEW HIGH-SPEED FACE MILLING MACHINE WITH EXCEPTIONAL POWER AND CAPACITY. CUTS UP TO 1000% FASTER THAN CONVENTIONAL MACHINES . . . EDGES PLATE; CHAMFERS PLATE AND BARS; CAN BE ADAPTED TO MILL ALUMINUM AND OTHER NON-FERROUS METALS.

New Kling machines like the Mill-All and the improved No. 4 Pinch Roll (illustrated here) point up the importance of checking your present results with those now obtainable with Kling. In view of the bright demand outlook for production involving rolling, cutting, facing, coping, punching, shearing, notching, etc. a checkup with a Kling Distributor should prove most rewarding. Write today for catalog bulletins. Please specify types of operations in which you are interested.



KLING PINCH ROLLS (PYRAMID TYPES ALSO AVAILABLE) . . . EMBODY MANY TIMELY IMPROVEMENTS. FEATURES INCLUDE ALL STEEL CONSTRUCTION; FULLY GEAR-DRIVEN ROLLS; EXTRA LARGE OPENINGS TO HANDLE AND EASILY REMOVE LARGE BEAMS AND CHANNELS; FULLY MESHED GEARS AT ALL ROLL OPENINGS; DROP END AUTOMATICALLY CONTROLLED AT OPERATOR'S POSITION TO ELIMINATE LOCKING AND UNLOCKING; DIAL INDICATORS AT EACH END OF ROLL FOR POSITIONING AND DUPLICATING.

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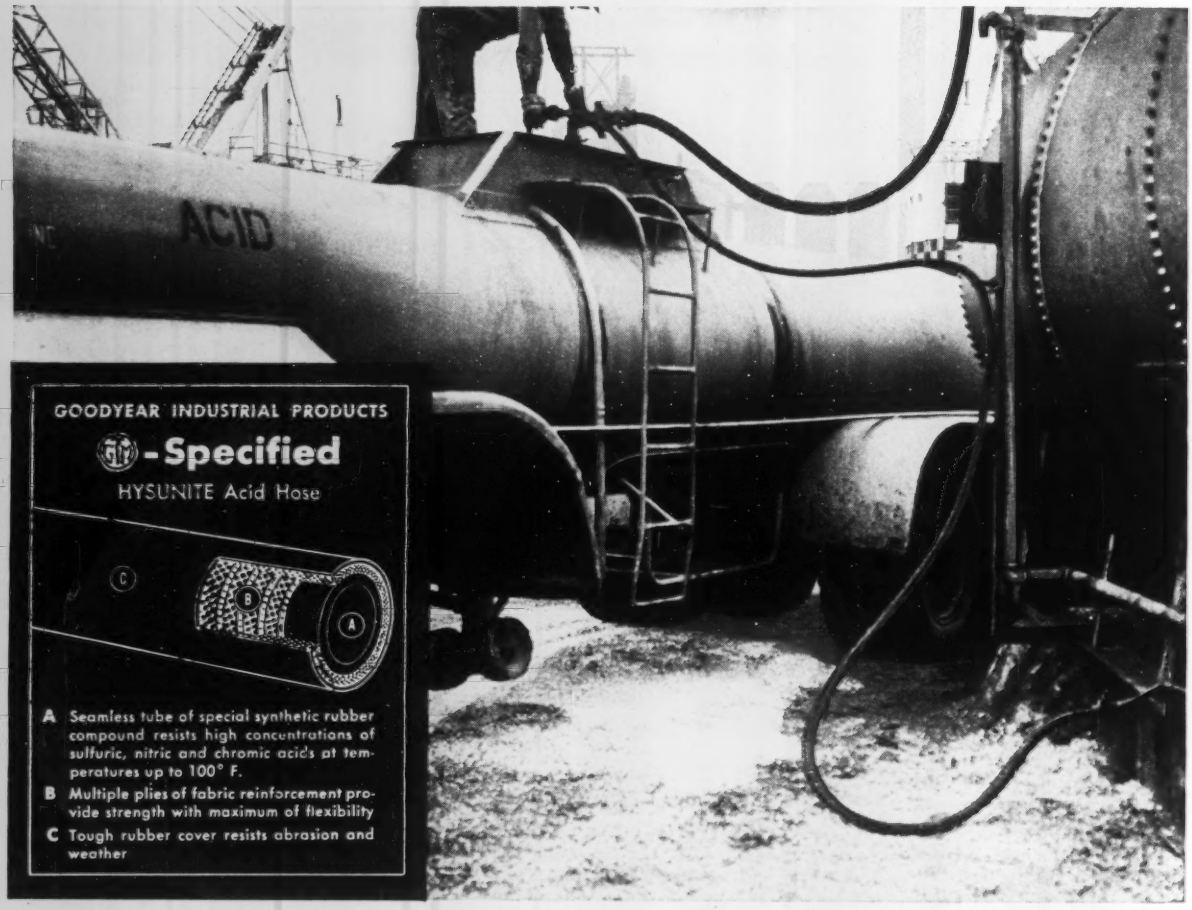
ACID
GOODYEAR INDUSTRIAL PRODUCTS
-Specified
HYSUNITE Acid Hose
C
B
A
A Seamless tube of special synthetic rubber compound resists high concentrations of sulfuric, nitric and chromic acids at temperatures up to 100° F.
B Multiple plies of fabric reinforcement provide strength with maximum of flexibility
C Tough rubber cover resists abrasion and weather

G.T.M. increases acid hose life by 900%

ACID—66° Baume Sulfuric—was the problem at this eastern steel mill. Many types of hose were tried for its transfer from truck to storage tank. But the best hose delivered *only 2,500,000 lbs.* of acid, before embrittling and breaking.

Then the G.T.M.—Goodyear Technical Man—recommended his new HYSUNITE Hose, specifically developed to handle highly oxidizing acids in high concentrations at temperatures up to 100° F. This rugged hose handled a fabulous *26,500,000 lbs.* of acid—was good for many more pounds—when it was removed from service for thorough checking.

If you have hose problems, it will pay you to consult your Goodyear Distributor and/or the G.T.M. Or write Goodyear, Industrial Products Division, Akron 16, Ohio.

HYSUNITE HOSE by

Hysunite—T.M. The Goodyear Tire & Rubber Company, Akron, Ohio

GOODYEAR

THE GREATEST NAME IN RUBBER

IT'S SMART TO DO BUSINESS *with your Goodyear Distributor. He can give you fast, dependable service on Hose, V-Belts, Flat Belts and many other industrial rubber and nonrubber supplies. Look for him in the Yellow Pages under "Rubber Goods" or "Rubber Products."*

IN THIS ISSUE

STEEL
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May 13, 1957
Vol. 140 No. 19

METALWORKING OUTLOOK

63 **Prospects for first quarter of 1958:** Production, prices and corporate income will rise moderately

☑ 69 **Michigan's proposed tax boost on industry** points up state tax problems

☑ 70 **Engineering shortage is problem of quality,** not quantity, panel finds

72 **Steel warehouse business is O.K.,** convention delegates agree

73 **Foundrymen** discuss economic and technical problems

74 **Antifriction bearing sales** in '57 seen at least equal to 1956's

75 **U.S. will change its equipment leasing policies** for defense, nondefense

79 **TV sales outlook** for 1957 hinges on color and portable lines

80 **Packaging can cut costs**—Co-ordinate it with shipping and receiving

81 **Modular press line eliminates obsolescence,** provides flexibility

97 **Bendix to expand** its Scintilla Division—Program to cost $5 million

COVER ARTICLE

109 **Inventory management**—Road to lower costs. No. 4 in STEEL's Program for Management—1957

TECHNICAL OUTLOOK

119 **New applications are in sight for aluminum diecastings** made by a cold chamber, vacuum process

☑ 120 **Today's hottest question:** Materials for use above 1500°F?

122 **Sequence-time studies automated**—Supersede human eye and stop watch

123 **Choosing the right quench** important in modern heat treatment

126 **Bolt takes ultrasonic heat**—Hot work die steels solve some problems

128 **Progress in Steelmaking**—Chemicals from the steel plant

134 **New dimensions for grinders**—Horsepower and capacities going up

136 **Pellets make better magnesium extrusions,** Dow Chemical reports

138 **Stress relief upgrades pipe welds** at Canadian hydroelectric plant

☑ 141 **How colored finishes for copper** can improve your product

154 **Custom spray painting facilities boost efficiency,** cut costs

156 **New countersinking machine boosts close tolerance work** some 400 per cent

159 **Tips on care of air compressors** and distribution systems

164 **Test for spring wire**—Torsion found more useful than tensile stressing

166 **Stainless steel foundry switches to CO_2** to harden cores

MARKET OUTLOOK

189 **Scrap prices reflect confidence**—Indexes and composites, 199; steel prices, 201; ores, 207; ferroalloys, 208; scrap trends, 210, prices, 212

☑ 191 **Uptrend looms for reinforcing steel**—First quarter was slow, but producers anticipate heavy demand for bars and fabric this summer

214 **Nonferrous metals**—Zinc price falls, lead may be next—Prices, 216

REGULAR FEATURES

6 Behind the Scenes
10 Letters to the Editors
16 Staff
23 Calendar of Meetings
67 The Editor's Views
76 Windows of Washington
83 Mirrors of Motordom
87 The Business Trend
91 Men of Industry
169 New Products
180 New Literature
218 Advertising Index

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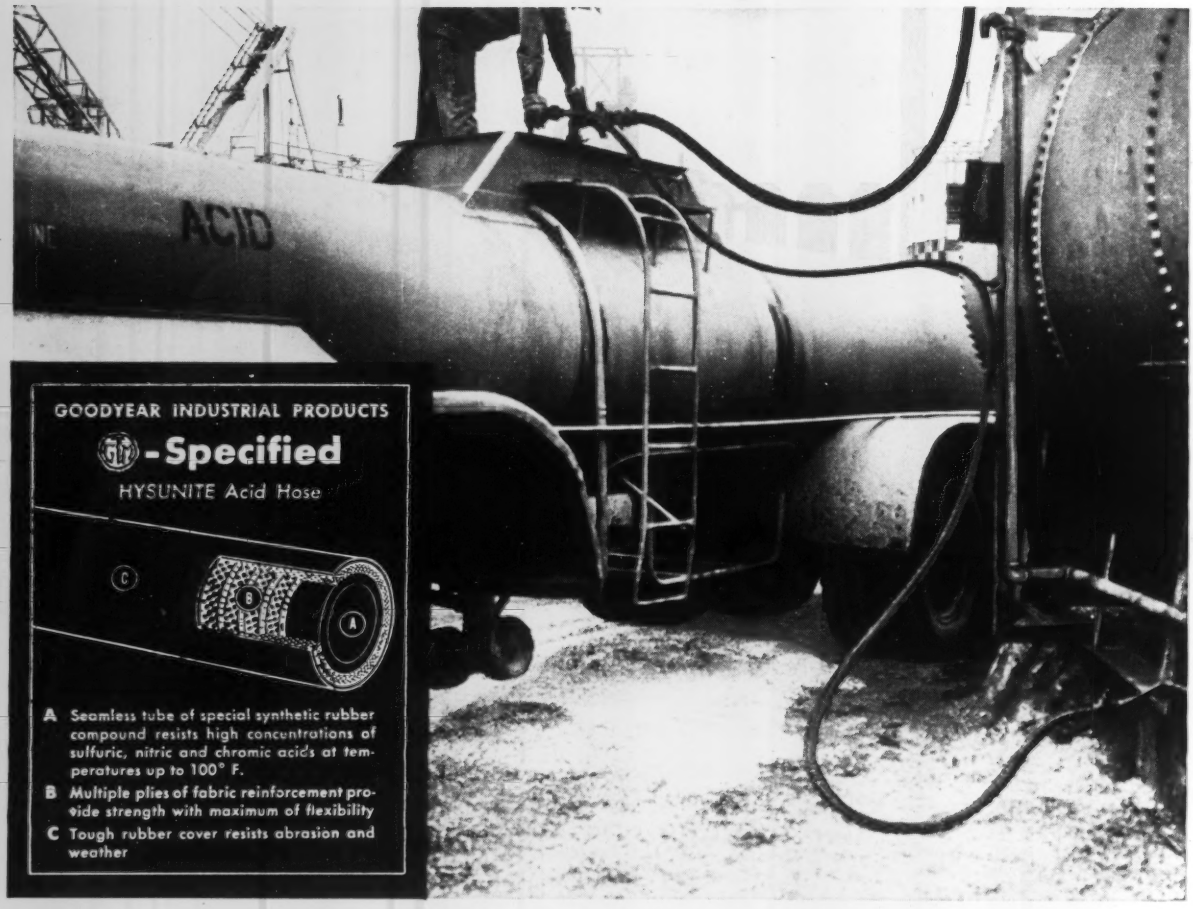
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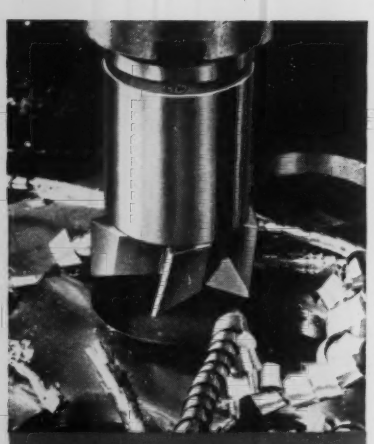
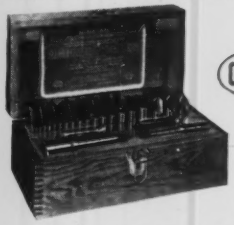


Continental Counterbores never bind. They disengage quickly, easily. Anti-wedging action saves time, tools and nerves. See your Ex-Cell-O representative or write Continental Tool Works, Detroit.



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Choice of three sets to fulfill the needs of large and small toolrooms. Write for catalog and prices.

57-33

Continental

TOOL WORKS

Division of

EX-CELL-O CORPORATION

DETROIT 32, MICHIGAN

behind the scenes

Brass Huddle

On a fine spring evening recently an agent of an unfriendly foreign power might have been observed flitting down West Jackson street in Chicago. His long rang objective was to put a dent in America's industrial production capacity, and his immediate objective was to blow up the Union League Club because it sheltered at that moment STEEL's editor, Walt Campbell, and his guests, ten highly regarded industrial executives.

Campbell had invited these leaders to participate in a brainstorming session; they included: William Caples, vice president, human relations, Inland Steel Co.; William Ylvisaker, vice president, Pheoll Mfg. Co.; Arthur Studt, manager, education and training, Hotpoint Co.; B. G. Milleville, chief engineer, Edward Valves Inc.; Kenneth Piper, director, human relations, Motorola Inc.; A. W. Virtanen, manager, heating and air conditioning, Rheem Mfg. Co.; Charles Gray, manager, communications, Bell & Howell Co.; Clement C. Caditz, president, Northern Metal Products Co.; Roger Cushman, assistant to chairman, Signode Steel Strapping Co.; and T. W. Bannon, chief engineer, Clearing Machine Corp.

"This was a mighty distinguished group to practice brainstorming with," Campbell told us later, "but you should have heard them clicking when they got into the swing of it. Our Chicago man, Bill Dean, set up a blackboard and a tape recorder, and we jumped into this business of engineers being in short supply. In less than a half hour, we had 110 ideas."

The full report of the meeting is on page 70. We could tell you more about it here, of course, but we want to add one of the bits that Campbell picked up. He said he saw a Volkswagen with a great big metal key welded to its stern, just like the kind used for toys. "Some happy soul with a crazy sense of humor went to a lot of bother for a gag," he grinned, "but he is getting plenty of action. That car draws more attention in Chicago than an honest politician."

There must be a fad about these things. Not long ago we heard about another miniature German car that carried a neatly lettered sign: "MADE BY ELVES IN THE BLACK FOREST."

Wondering about the authority we had in making that statement about Dimitri? We were careful to say "might have been observed." There's no more beautiful evasive mechanism in any language than the subjunctive mood.

For Your Dead Files

Some of the more interesting publicity releases that have drifted into our coop lately concerned international friction, an automatic gavel, a new pitch on automobile horns and the sale of spittoons. The famous international Blue Water Bridge joining Port Huron, Mich., and Sarnia, Ont., began to make loud popping noises shortly after it was built. The structure wasn't falling down: Large bolts contracting and expanding with temperature changes made the racket. Engineers applied some grease called Dag, made by the Acheson Colloids Co., Port Huron, and the bridge hasn't murmured since. Dave Choate, of Minneapolis-Honeywell Regulator Co. made an automatic gavel. It is operated by pushbutton, and can be made to suggest, by its volume and tempo, various moods. The speaker can select Tired, Normal, Mad, Drop Dead or Apoplectic. (A buzzer sounds with the latter.) R. S. Thornburgh, head of Buick's Electrical Division, changed Buick horns from E flat and G to F and A. He said the new chord gives better penetration through road noise. Miss M. M. Walz, Milwaukee, called our attention to a sale of 300 brass spittoons by the Milwaukee County courthouse. Of course, this jimdandy sales isn't open yet; the county board has to grant its permission, but when it does, brother, you'll have to stand in line. Charles Dickens would have loved this bit of intelligence; he wrote a whole chapter once about American spittoons. How about it, Charlie? Any brass ones where you are?

Shrdlu

(Metalworking Outlook—Page 63)

Carbide tipped slab broaches.

Partial view of a conventional round hole broach. Roughing, semi-finishing and finishing teeth are shown.

This solid carbide finishing shell fits on an arbor of a conventional round broach.

Surface broach with adjustable and replaceable carbide tipped tool bits.

Here's Why Continental Quality Broaches Actually Cost Less Than Ordinary Broaches

After all, the price paid for a broach may be only the beginning of broaching expense. To the original cost of the broach must be added the cost of work delays, scrapped parts, and time-consuming adjustments.

However, if the broach is free cutting, holds the required tolerances and finishes, with the maximum pieces per tool, your original cost may be your only cost.

Because Continental effectively combines quality materials, skilled craftsmanship, and engineering experience, it is a fact: "the best broaches cost less."

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TOOL WORKS
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Detroit 32, Michigan

56-64

STAINLESS STEEL MAKES THE DIFFERENCE

...its effect on modern appliance design

Make it more attractive—longer-lasting—easier to keep clean. And keep it simple to make. More and more designers "build in" such powerful selling points with stainless steel.

Stainless keeps pace with modern trends. Now there are more than 30 different types and a variety of textures, surface tones and colors. The hard-selling values of superior corrosion resistance, durability and toughness, long associated with stainless give you assurance of consumer acceptance at the point-of-sale.

For more facts about stainless steel and the contribution it can make to your product or marketing problems, see your stainless steel supplier or write ELECTROMET—leading producer of more than 100 alloys for the metal industries, including chromium and manganese used for making stainless steel. Ask for the booklet "Stainless Steel in Product Design." Address:

ELECTRO METALLURGICAL COMPANY
A Division of
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30 E. 42nd Street UCC New York 17, N.Y.
In Canada: Electro Metallurgical Company, Division of Union Carbide Canada Limited, Welland, Ontario

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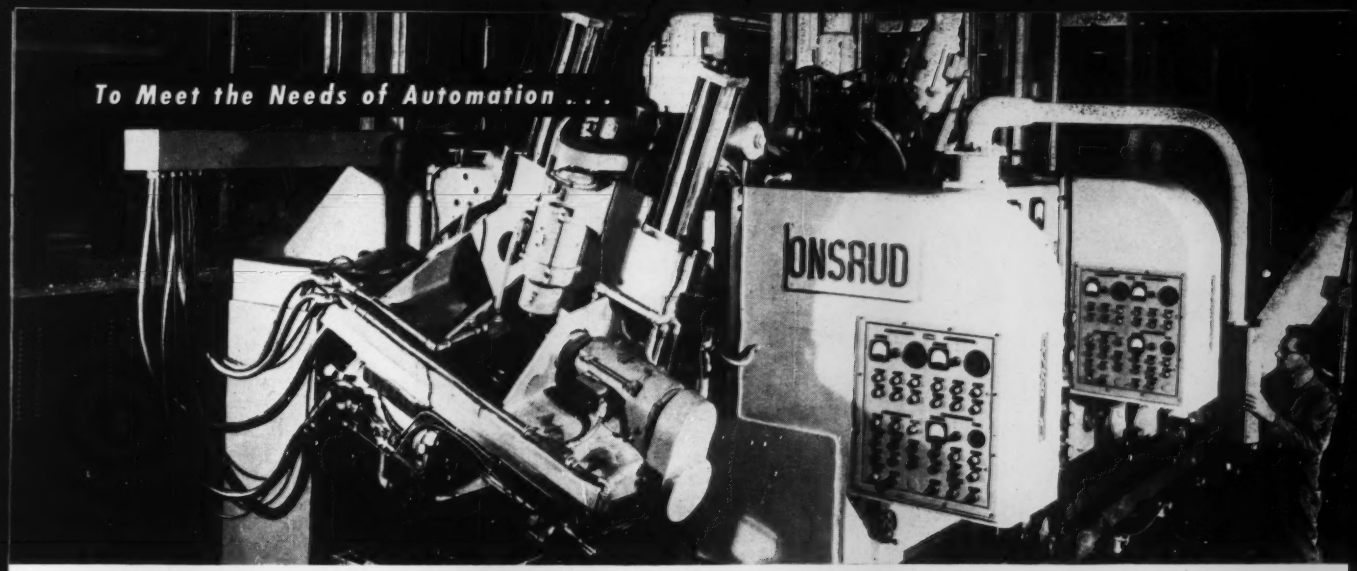
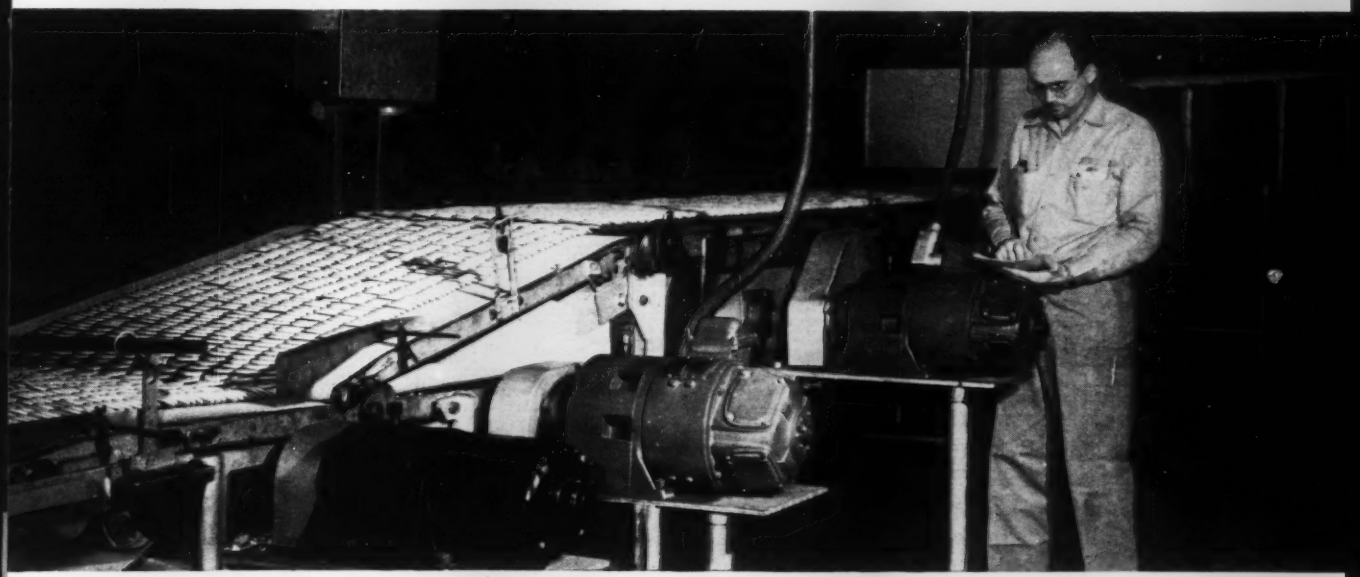
Electromet
Trade Mark
FERRO-ALLOYS AND METALS

Stainless steel styling adds the attractive, durable, "easy-to-clean" appeal which is helping to put across this new idea in cooking units.



FROM AUTOMATED MACHINES . . .



TO COOKIE CONVEYORS . . .

General Electric Gear-Motors Prove Low-Cost Dependability in Every Industry

Whether you use cranes or conveyors, machine tools or mixers, *any* of the host of applications employing low-speed drives, G-E gear-motors can save you money.

The more compact construction of the packaged gear-motor design assures speed reduction in a minimum of cubic feet. Units are easy to install, and, because gear-motors are built for specific speed requirements, may be direct-connected, if desired. This means down time can be reduced because inspection and replacement, common with belts, chains and other forms of speed reduction, are not required.

To meet the increasing demand for gear-motors, General Electric has consolidated its gear-motor activities and established a new Gear Motor and Transmission Components Department in Paterson, N.J., devoted solely to the design and manufacture of mechanical power transmissions. For more information, contact your G-E Apparatus Sales Office or nearest gear-motor distributor. *Gear Motor and Transmission Components Department, Paterson, New Jersey.*

851-4

Progress Is Our Most Important Product

GENERAL ELECTRIC

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"In AMM . . . the daily newspaper we know our customers read every day"

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Over 31,000 metals executives follow American Metal Market every day for a very good reason. It's the only complete daily source for the market information that these heavy-volume metal users find indispensable to their daily operation. Proof lies in the fact that 81.5% of AMM's national circulation is concentrated in the 12 states where 82.84% of all metal working plants are located. Recognition of this concentrated ABC-audited reader-interest has kept AMM at the top of metal advertisers' schedules year after year. Does it head your list?

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ABC

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American Metal Market

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1882 75th ANNIVERSARY 1957

THE DAILY NEWSPAPER OF THE STEEL AND METAL INDUSTRIES. ESTABLISHED 1882

LETTERS TO THE EDITORS

Table Eliminates Problems

Please send ten copies of the article, "What Makes a Good Deep Drawing Steel" (Apr. 22, page 78). Using the table as a reference, we hope to eliminate a good percentage of our problems with drawing quality steels.

William R. Kinderman
Material Control Supervisor
Active Industries Inc.
Elkton, Mich.

Compensations of Short Week

Please send a copy of the article, "Short Week: Fact Vs. Fancy" (Feb. 18, page 107). My compliments for an article well done.

Could you also refer me to the source of the quotes of Prof. Sumner Slichter? If you have an extra copy of this speech or article, I would appreciate it.

Irving H. Sabghir
Labor Relations Analysis Section
Ford Motor Co.
Dearborn, Mich.

● *The remarks were made in a speech before the annual meeting of Associated Industries of Cleveland in February. For an extra copy of the address, write Professor Slichter at Harvard University, Cambridge, Mass.*

Fine Job on Selector

We have received a copy of your Welding Electrode Selector (Apr. 1 insert) and congratulate you on such a fine, comprehensive job. Would it be possible for us to receive 100 copies?

Byron E. Helms
Advertising Manager
Victor Equipment Co.
San Francisco

What Is Profit Sharing?

You have quite an article, "Profit Sharing," in your Apr. 15 issue (page 115).

I note that you say our program here is not fundamentally a profit sharing scheme. That depends entirely on what you call profit sharing.

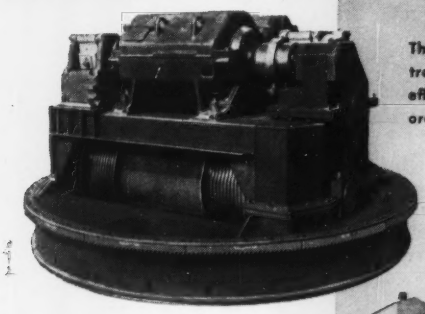
I would like to cite a few facts:

We have had our program now for 24 years. During that time, our man-hours per unit of production have been reduced by more than 93 per cent, and we make the same product today as we did then.

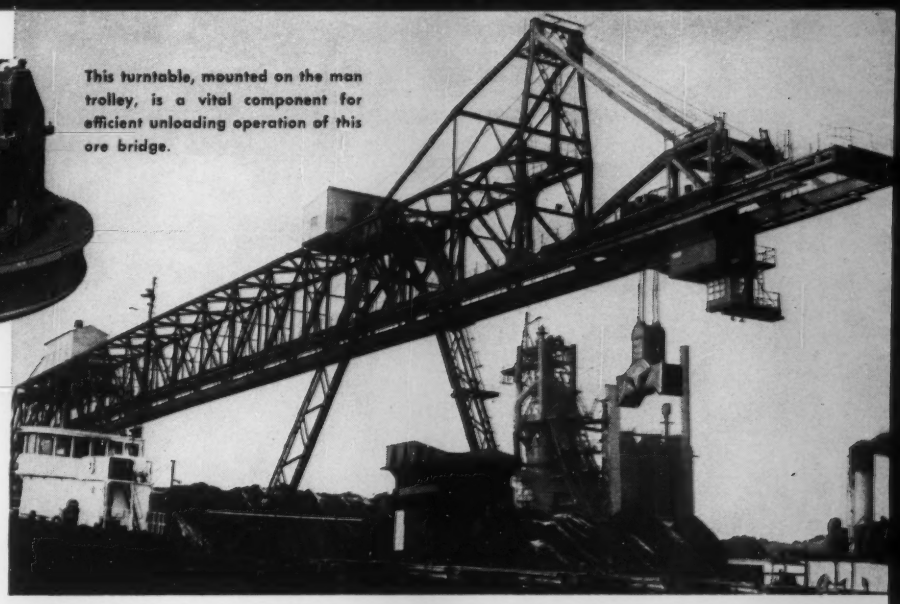
We have been able to keep our price below the price that was set for our product 24 years ago. I doubt if you will find any other manufactured product sold at the present time of which this is true.

Our stockholders at the present time

(Please turn to page 12)



This turntable, mounted on the man trolley, is a vital component for efficient unloading operation of this ore bridge.



Ore Handling Brings to mind *Heyl & Patterson*

H & P BRIDGES HAVE THESE RECOGNIZED FEATURES:

- Wide flange beam construction to reduce dirt pockets.
- Adjustable voltage control for smooth trolley operation, for increased hoisting speed, for reduction of trolley weight, for drastically lowered power consumption.
- H & P special turntable for unloading bridges.
- Aluminum contact conductors.
- Fabreeka mountings for improving performance and lowering maintenance.
- Worm gear driven trucks—fully equalized.
- H & P automatic hydraulic rail clamps for bridge safety.
- H & P automatic hydraulic buffers for trolley safety.

WHY WE SAY: "When experience counts—count on Heyl & Patterson." Since 1905—when the name Heyl & Patterson first appeared on a traveling bridge—we have built MORE THAN 100 ORE AND COAL BRIDGES, with most of them still in daily service—even after 50 years of operation. AMONG THESE ARE:

- An H & P Bridge with the longest span—552 ft. (712 ft. overall).
- An H & P Bridge handling the largest bucket—22½ tons rated capacity.
- An H & P Bridge with the highest free digging capacity—over 1600 TPH carrying ore from center of stockpile to hopper.

This long tradition of accomplishments, coupled with progressive engineering, has produced today's advances in H & P bridge designs. RECOGNITION OF THIS LEADERSHIP is the significant fact that we now have 4 ORE BRIDGES ON ORDER:

- One 12 gross ton stocking and reclaiming bridge for a large West Virginia steel plant (the fourth H & P bridge for this customer).
- One 15 gross ton boat unloading, stocking and reclaiming bridge for a prominent Michigan steel company receiving ore by lake ore carriers.
- One 15 gross ton stocking and reclaiming bridge for an important Pennsylvania steel plant. This bridge will join another H & P ore bridge operating since 1953.
- One 20 gross ton boat unloading, stocking and reclaiming bridge for a leading Canadian steel plant on the Great Lakes.

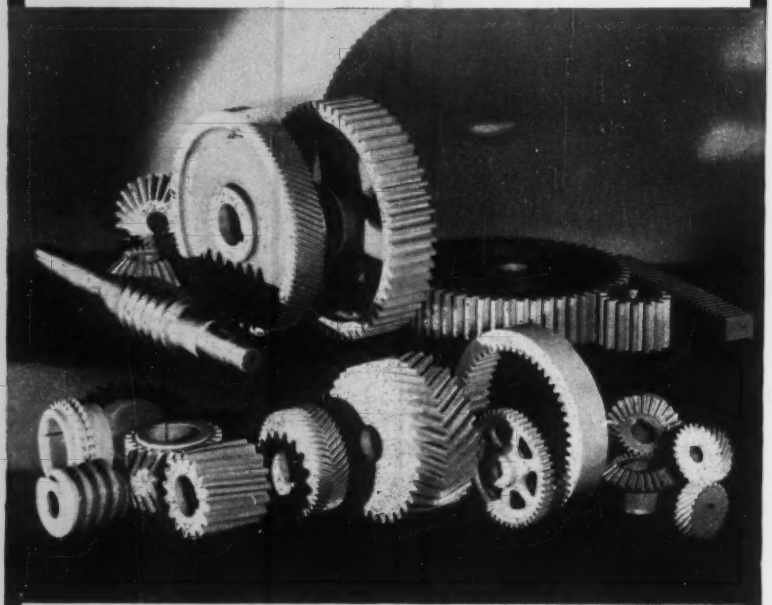
Heyl & Patterson
INC.
33 FORT PITT BLVD. • PITTSBURGH 22, PA.

When Experience Counts . . .
Count On Heyl & Patterson!

One of these 9

H&S Gears

is sure to answer your power transmission needs!



Spur • Racks • Bevel • Mitre • Internal • Worm • Helical • Spiral • Herringbone

Regardless of type, every H & S Gear is of the rugged, "husky" type. Heavy rims are well reinforced. Hubs are heavy in section, eliminating the need for key patches. All sharp corners are broken and generous fillets are provided.

H & S Gears are available of Steel, Hardened Steel, Alloys, Cast Iron, Bronze, Rawhide, Fibroil, or Bakelite.

Exacting care is exercised in every manufacturing step of H & S Gears. This insures *quietness of operation, uniform velocity ratio,* and *freedom from vibration.*

Whether you need a gear that weighs one ounce or 10 tons, why not put our years of gear engineering experience to work for you. Just send us the specifications or call. There's no obligation.

THE HORSBURGH & SCOTT CO.

GEARS AND SPEED REDUCERS

5112 Hamilton Avenue

Cleveland 14, Ohio

Send note on Company Letterhead for complete H & S Catalog

LETTERS

(Concluded from page 10)

are getting three and a half times as much dividends as they did when the program started.

We have increased our floor space by more than ten times, and all of it has been paid for out of retained profits. Therefore, we do not pay more than the worth of what is produced by our workers.

The average reward to the worker has been more than double that of the union rates in the Cleveland area. It is obvious, therefore, that our productivity must be much higher than is true of the average union shop or of our competitors. I might say that our productivity is more than four times that of competition.

J. F. Lincoln
Chairman
Lincoln Electric Co.
Cleveland

• *Lincoln Electric's program is explained in detail in the Program for Management article, "Motivating Men To Produce More" (Sept. 24, 1956, page 105).*

Why Businesses Fail

I would appreciate your sending two copies of the interesting article, "Business Failures Mount" (Apr. 22, page 56).

Fred E. Noe
Markets & Economics Division
Island Creek Coal Co.
Huntington, W. Va.

Training Tomorrow's Executives

You are to be congratulated for your excellent Program for Management articles, "Management Development—The Care and Feeding of the Junior Executive" (Feb. 11, page 93) and "Management Development—Grooming Middle Managers" (Mar. 18, page 93). Yours is the first major publication to recognize this problem.

J. P. Nally
Advertising Manager
Rochester Products
Division of General Motors
Rochester, N.Y.

More Credit Due Magnesium

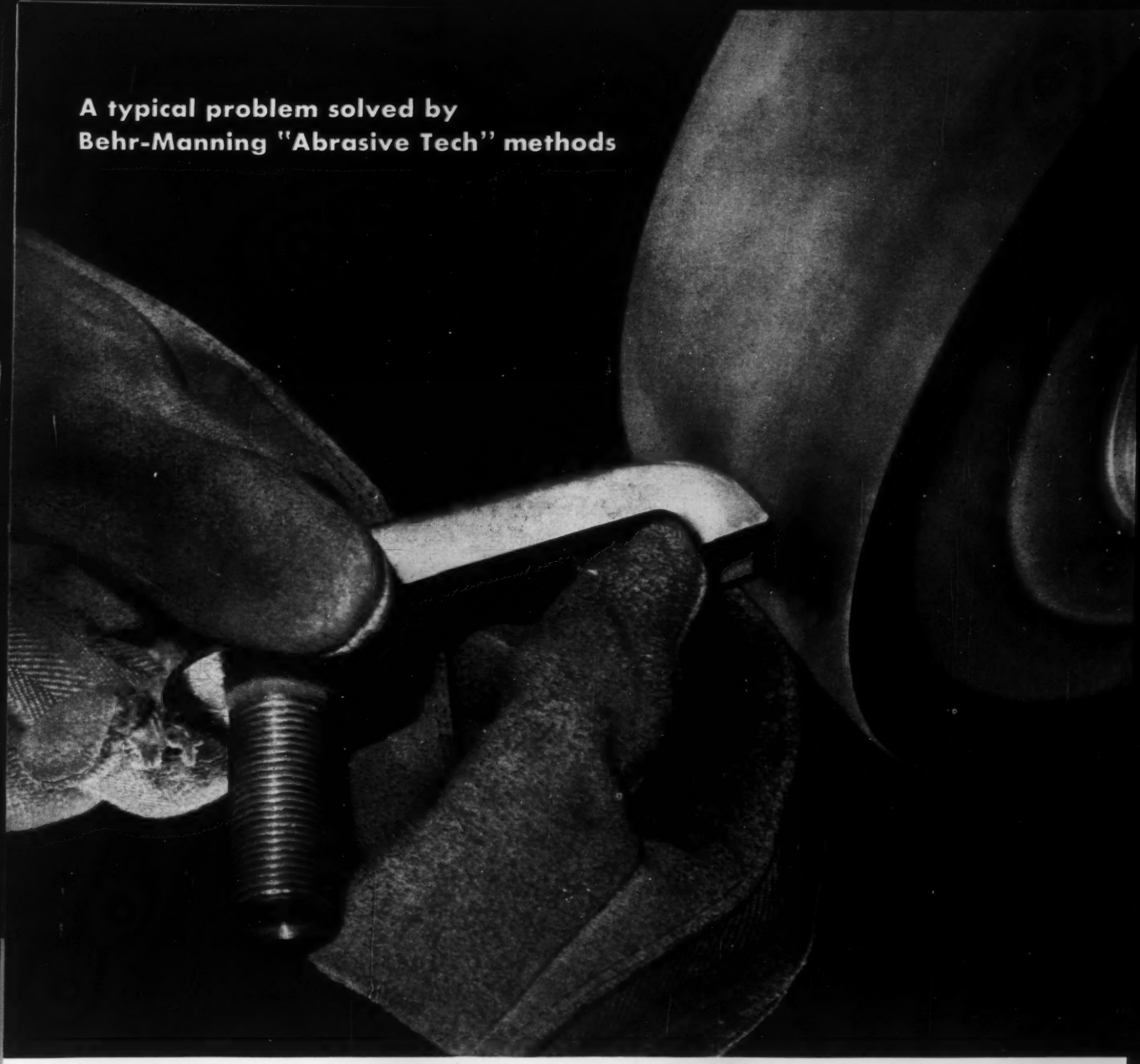
We found the article, "Exploring the Thermal Barrier" (Mar. 11, p. 154), a most challenging piece of writing. It outlined pretty accurately the problems which speeds of the future will impose, but it cut magnesium off short.

Our best magnesium-thorium alloys will handle aerodynamic or environmental temperatures up to 750°F, depending on duration of exposure.

Magnesium-thorium alloys not only will do a creditable job in many applications now pre-empted by titanium and stainless alloys—they'll do it for considerably less money. That they are not being used more widely may be due, in part, to a traditional lack of cost consciousness in our military aircraft industry.

Far too often, it appears, design engineers have had no qualms about specifying materials with properties far above the minimum requirements—at any price. Quite possibly the refreshing scrutiny being given to the defense budget may alter this situation in time.

William M. Cox
Public Relations Department
Dow Chemical Co.
Midland, Mich.



8 steps in finishing were eliminated by using abrasive belts to rough and polish cast-brass faucets prior to plating. Polishing, for example, was faster and smoother with a 3-in. x 90-in. Lightning Metalite Cloth belt, grit 240, running at 9000 sfpm over a 14-in. stitched buff contact roll on a Crown Rheostat Polishing Lathe. The belt is lubricated with a light grease stick. Time, labor, and material costs have all been cut by this "Abrasive Tech" method. Perhaps Behr-Manning technical service may provide similar benefits for your production.

Very often a Behr-Manning methods engineer can provide a helping hand with different finishing problems. Just call the nearest Behr-Manning office for a date. There are 17 well-equipped "Abrasive Tech" Methods Rooms, available for problem-solving, or helping finishers brush up on new techniques: Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Detroit, Grand Rapids, High Point, Indianapolis, Los Angeles, Teterboro, Camden, San Francisco, Seattle, St. Louis, and Brantford, Canada. Main office and plant: Troy, N. Y. For Export: Norton Behr-Manning Overseas, Inc., Troy, N. Y., U.S.A.

BEHR-MANNING CO.

A DIVISION OF NORTON COMPANY

NORTON ABRASIVES

BEHR-MANNING PRODUCTS: Coated Abrasives • Sharpening Stones • Behr-cat Tapes
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BEHR-MANNING ®

We made this pledge

"Morse . . . will give, grant, bargain, sell and convey unto dealers and users . . . Machinist's Tools . . . made of the best quality of steel, of fine finish, and not excelled as to durability and accuracy."

He renews this pledge in 1957... your MFD*

"To Have And To Hold said tools with all the privileges thereto belonging to their own use and behoof forever. That we have good right to sell and convey the same as aforesaid, and that we will warrant and defend the same to said grantees."

* **Your Morse-Franchised Distributor** knows that Morse stands behind this warranty just as solidly today as we did 89 years ago. And in his name and behalf, Morse now re-publishes this warranty as an earnest of good faith backing up every Morse Cutting Tool you buy. Yes, you can bank on Morse . . . and on your Morse-Franchised Distributor.

MORSE TWIST DRILL & MACHINE COMPANY • NEW BEDFORD, MASS.
A Division of VAN NORMAN INDUSTRIES, INC.
Warehouses in New York, Chicago, Detroit, Dallas, San Francisco

MORSE

in 1868

Know All Men By These Presents

That we

The Morse Twist Drill & Machine Company

A corporation duly organized under the laws of the Commonwealth of Massachusetts, and doing business at New Bedford, in the County of Bristol, in said Commonwealth; in consideration of good and current coin of the realm, in amounts as set forth in the catalogue of said company—which can be readily obtained upon application—will give, grant, bargain, sell and convey unto dealers and users of Machinists' Tools, located in every part of the civilized world, certain tools hereinafter mentioned, made of the best quality of steel, of fine finish and not excelled as to durability and accuracy. Said tools consist of

Arbors for Drill Chucks; Shell End Mills; Shell Reamers and Face Milling Cutters; Beach, Stetson and Center Drill Chucks; Counterbores; Countersinks; Solid and Adjustable Counterbores with Bit Point Drills; Dies; Bit Point and Bit Stock Drills; Increase Twist and Constant Angle Drills; Three and Four Groove Drills; Drills with Grooved Shanks; Hollow Drills for deep drilling or long holes; Jobbers' Drills; Letter Drills; Drills with Oil Holes; Taper Square Shank Drills; Wire Drills; Caliper, Plug and Ring, Twist Drill and Steel Wire Gauges; Mandrels; Metal Slitting Saws; Milling Cutters; Concave and Convex Cutters; Cutters for Grooving Taps; Cutters with Radial Grooves; Screw Slotting Cutters; T Slot Cutters; Gang Cutters; Sprocket Wheel Cutters; Interlocking Cutters; Involute Cutters; Cutters for Mitre and Bevel Gears; Stocking Cutters for Involute Gears; Adjustable Hollow Mills; End Mills; End Mill's with center cut; Shell End Mills; Cutter Mills; Taper Pins; Reamers with Oil Holes; Bit Stock Taper Reamers; Shell Reamers; Expanding Shell Reamers; Fluted Chucking Reamers; Rose Chucking Reamers; Shell and Rose Shell Reamers with Spiral Flutes; Taper Pin Reamers; Bridge Reamers; Locomotive Reamers; Three-Groove Chucking Reamers; Screw Plates with Dies; Sleeves; Sockets; Machinists' Hand Taps; Machine Screw Taps; Nut Taps; Patch Bolt Taps; Pulley Taps; Pipe Taps; Stay Bolt Taps; Stove Bolt Taps; Machines as follows: Bench Centers, Drill Grinding, Face Grinding, Gear Testing and Straightening Press.

To Have And To Hold said tools with all the privileges thereto belonging to their own use and behoof forever; That we have good right to sell and convey the same as aforesaid, and that we will warrant and defend the same to said grantees.

In Witness Whereof, We, the said Morse Twist Drill & Machine Co., hereunto set our hand and seal this Sixth day of April, A. D.

L.S.

Morse Twist Drill & Machine Co.

means "THE MOST" in Cutting Tools

A little GOLD in our hair

PRESIDENT, THE CINCINNATI GEAR CO.

We're older than we look. In fact, our firm is 50 years old this year, and while we haven't *actually* taken to tinting our hair gold, we *are* doing our best to let everyone know about this, our golden anniversary. Because we think it's something of an accomplishment — 50 years of uninterrupted progress and growth and leadership in gear-making that have made our reputation "good as gold." That reputation has been as much the result of adhering to some old-fashioned ideas about craftsmanship, service and attention to details as it has been the result of aggressive pursuit of the latest technological advancements in gear manufacture. It's a reputation we've worked hard to earn in the 50 years past, and one we'll work equally hard to perpetuate in years to come . . . a reputation for producing the best in custom "gears . . . *good gears only.*"

THE CINCINNATI GEAR CO.
CINCINNATI 27, OHIO
Fifty Years of "Gears—Good Gears Only"

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FOR ALL ELEMENTS OF A MACHINE

One Lubricator Per Machine — Model 33AL-4 (½") Lubrication Unit automatically creates finely divided air-borne oil fog. Completely lubricates a machine having a maximum requirement of 100 bearing inches.

Better Lubrication — Continuously applies protective film of fresh oil to lubrication points. Never periods of too much or too little lubrication.

Compact, Complete, Attractive — Measuring only 6-1/32" x 6-1/32" x 5-3/16", cabinet contains air filter, pressure regulator, MICRO-FOG Lubricator.

Visual Oil Feed — Oil feed is readily visible, providing positive proof of lubrication. No guesswork.

For complete information on MICRO-FOG Lubrication for all bearing inch requirements, call your nearby Norgren Representative listed in the telephone directory — or WRITE FOR FACTORY LITERATURE.

C. A. NORGREN CO.

3412 SOUTH ELATI STREET • ENGLEWOOD, COLORADO

In 10 short years the Chambersburg CECO-DROP has become the standard gravity drop hammer of the forging industry. Some of the reasons for this astonishing success are these:

1. The Ceco-Drop is a proven tool, the original "Boardless Board Drop Hammer," with world wide acceptance.

2. More than 400 Ceco-Drops are in service in 119 forge shops all over the world. Many companies have initiated programs looking toward complete conversion to Ceco-Drops.

3. The Ceco-Drop has created new standards of performance, and established new standards of tolerance in drop forgings.

4. The Ceco-Drop minimizes leg fatigue in drop hammer operation. Hammermen prefer the Ceco-Drop.

5. The Ceco-Drop costs less to maintain, has fewer, more durable parts. Automatic lubrication prolongs parts life.

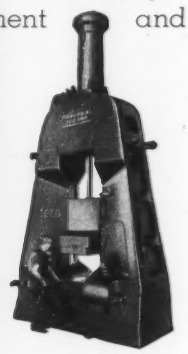
6. The Ceco-Drop is economical to operate. Air or steam is used only when the hammer is running.

7. The Ceco-Drop forges more minutes per hour. (Once it is set-up, just turn on the air or steam and forge.) It does more forging per blow, requires no board changes, no friction adjustment.

8. The Ceco-Drop is safer . . .The operator's station is clear. There are no overhead hazards. It has fewer, lighter mechanisms. It has a safety dog and safety cylinder cover. Power failure stops the hammer and clamps the ram.

9. The Ceco-Drop requires less die set-up time. Die changes are quicker, easier. It takes but a minute to adjust the stroke.

10. The Ceco-Drop has a wide range of operation due to the unique short stroke adjustment and control.



CECO-DROP

U. S. PATENT NO. 2,604,071, JULY, 1952 . . . OTHERS PENDING
CECO-DROPS HAVE BEEN BUILT IN SIZES FROM 500 LBS. TO 8000 LBS.

Builders of THE IMPACTER
"FORGING IN MID-AIR"

CHAMBERSBURG ENGINEERING CO. • CHAMBERSBURG, PENNA.

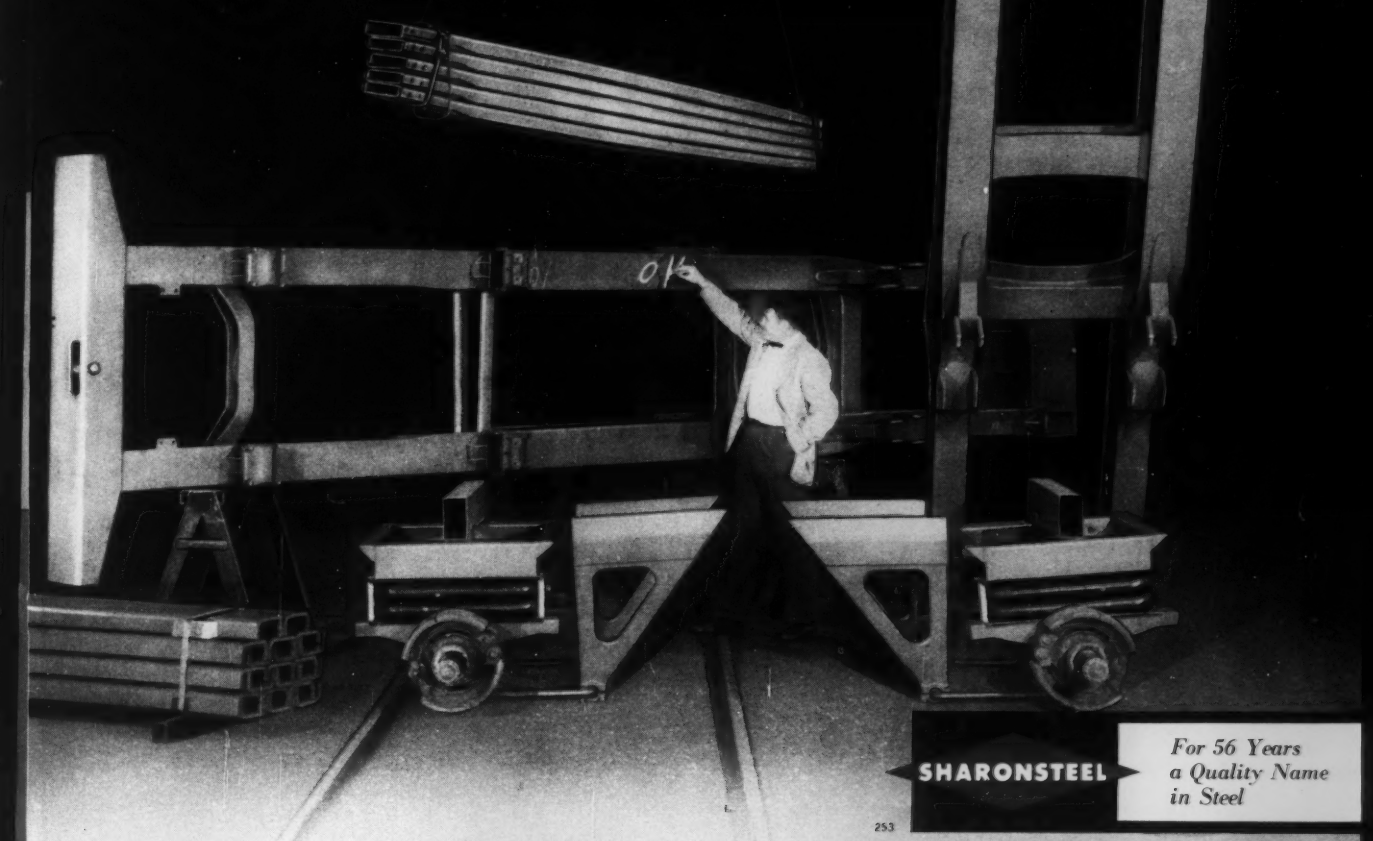
IN TRANSPORTATION EQUIPMENT, TOO

Sharonsteel Quality STANDS OUT

The quality standards and specifications of the transportation equipment manufacturers are known to be among the most exacting in American industry.

For this reason, many leading suppliers of automotive bus, truck and trailer chassies; railway cars, trucks, underframes and the exciting new air spring suspension (foreground) depend on Sharon Steel for high strength, low alloy strip and plate used in their products.

Other types of steel selected by the industry for their high quality are Sharon's line of stainless, coated and alloy strip and plate.



SHARONSTEEL

For 56 Years a Quality Name in Steel

253

SHARON STEEL CORPORATION, SHARON, PENNA.

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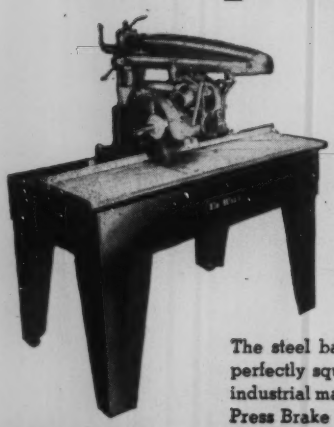
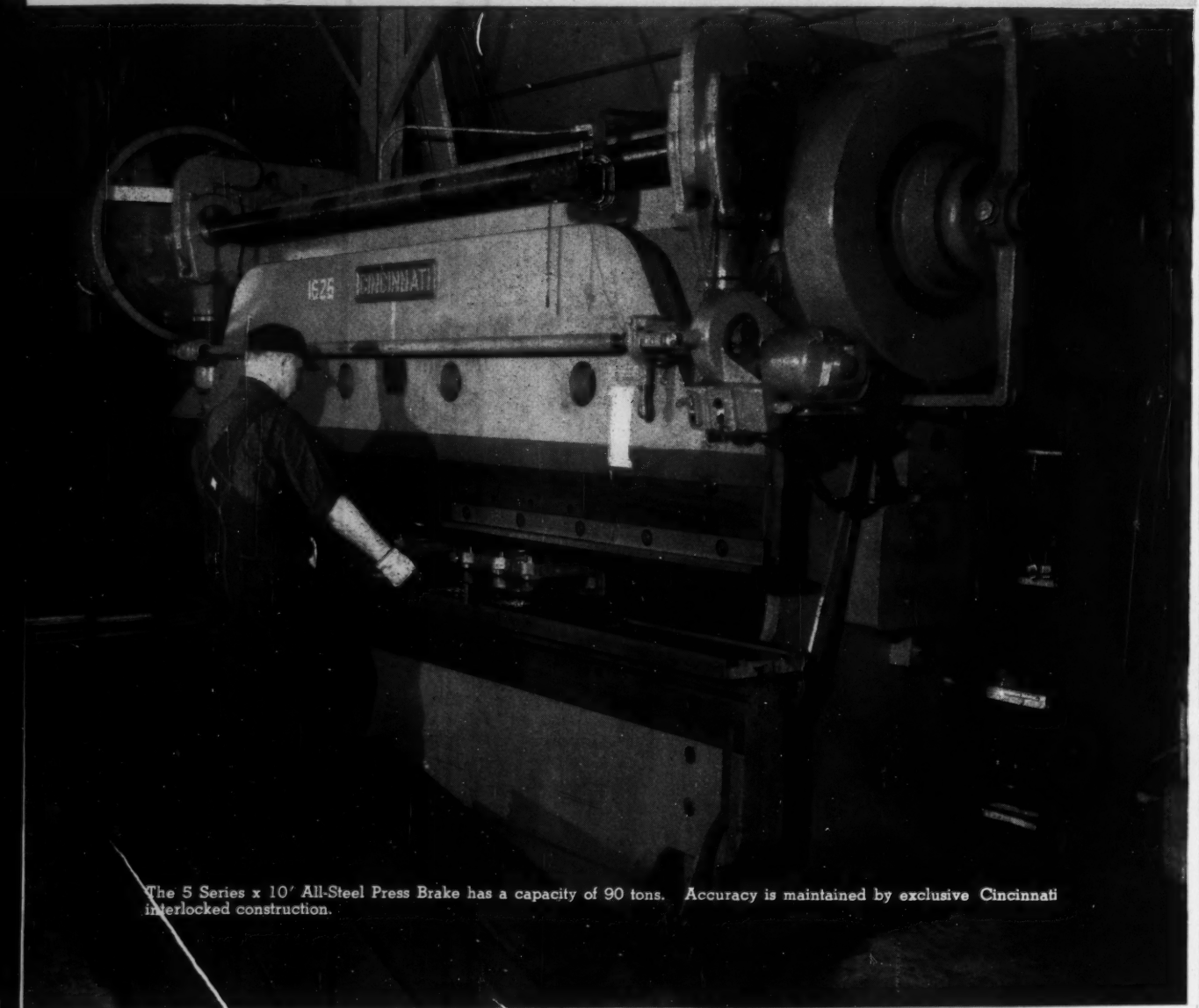
1/3 cost reduction combined with product improvement...by use of Cincinnati Shear and Press Brake

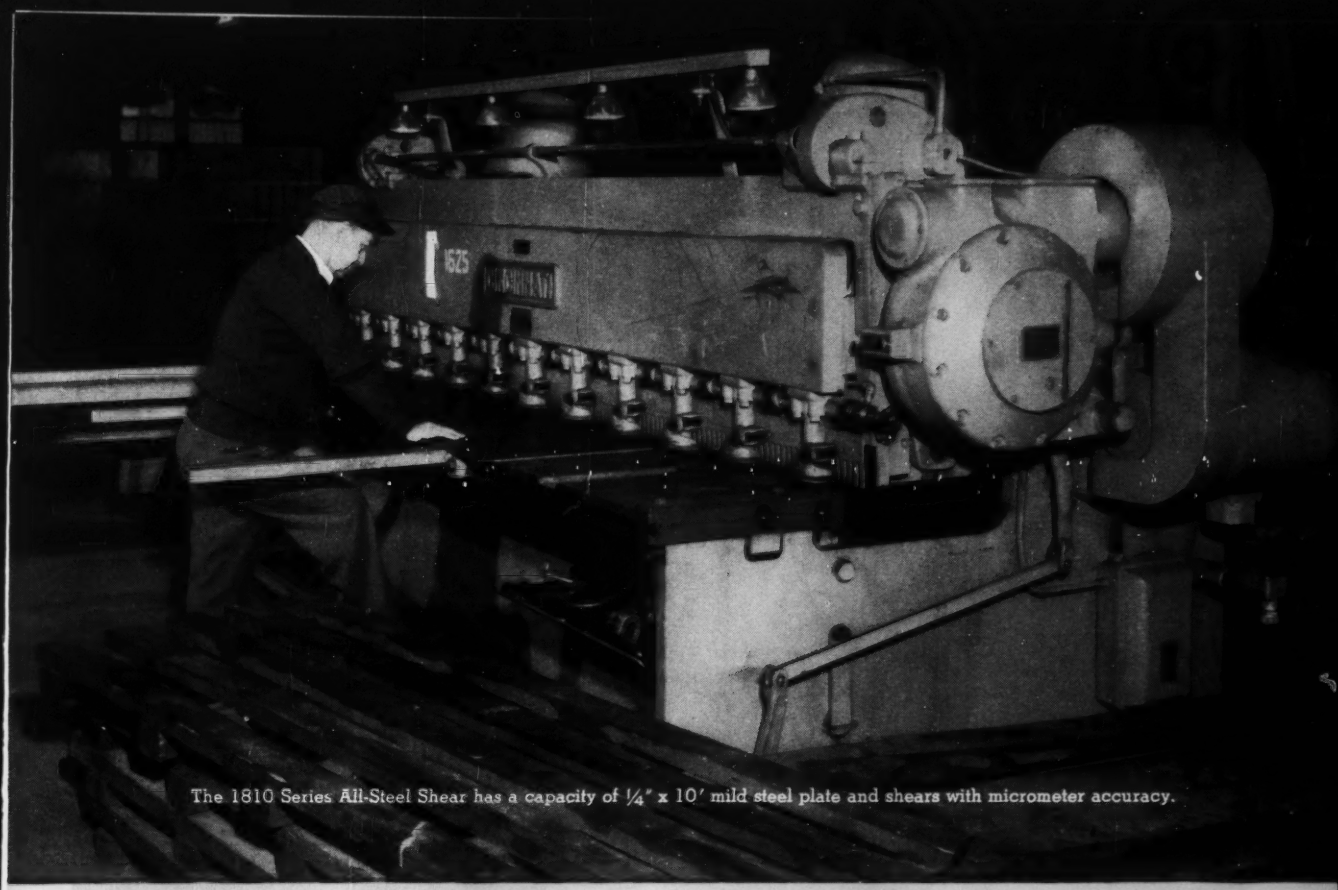


...at **DE WALT INC.** Lancaster, Penn.

The steel bases of all DeWalt woodworking machinery must be perfectly square, flat and true. Both home shop and heavy duty industrial machines are produced on the Cincinnati Shear and Press Brake shown.



The 5 Series x 10′ All-Steel Press Brake has a capacity of 90 tons. Accuracy is maintained by exclusive Cincinnati interlocked construction.



The 1810 Series All-Steel Shear has a capacity of ¼" x 10' mild steel plate and shears with micrometer accuracy.

Photos courtesy DeWalt Inc., Lancaster, Pa.

This performance story from DeWalt Inc. tells of improved quality and reduced costs. We quote: "Before purchasing the Cincinnati Shear and Press Brake, we bought formed channels and arc welded them together at the seams. We now buy sheet steel stock—then cut, punch, form, and spot weld the steel bases in our own plant. We have ***reduced costs on this operation by over 1/3*** on the first run employing these methods, and expect costs to diminish still more as operator familiarity and efficiency increase. In addition to the cost factor, it was previously difficult to maintain precision flatness in the tables. Using the new methods and the Cincinnati machines, we now have no difficulty."

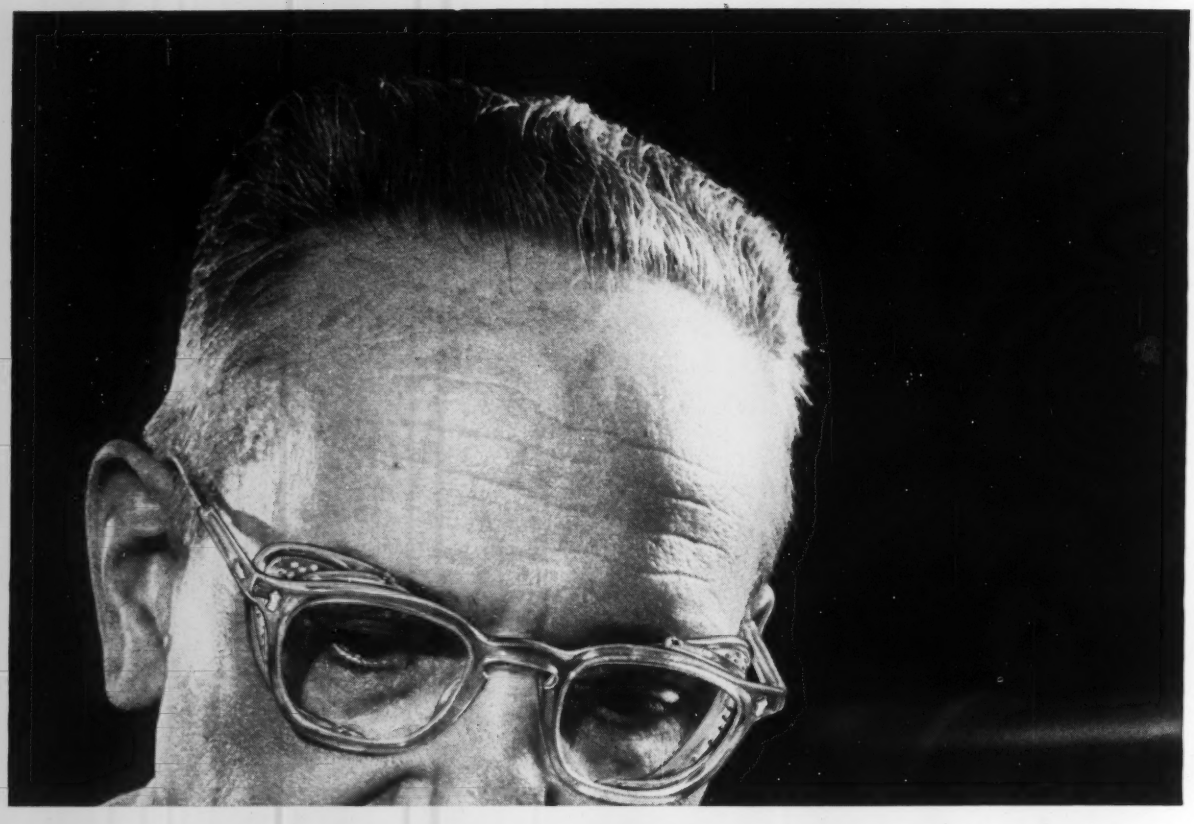
Note the improved design of the Model MB "Power Shop" machine shown at right above. The new, improved cabinet is now produced on the Cincinnati Shear and Press Brake at an ***overall cost reduction of 15%***. Previously the cabinet at left was a purchased item.

Write Department C for Catalog B-4R and Catalog S-7R and consult our Application Engineering Department about your production problems.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS · SHEARS · PRESS BRAKES

CINCINNATI



New Advanced Features Make AO Ultrascopic Safety Glasses A Better Buy Than Ever

When we introduced American Optical Ultrascopic Safety Glasses, we intended them to be the finest, most advanced eye protection equipment available. They were enthusiastically accepted by industry at all levels. A tremendous increase in eye protection sales attests to this success. They truly have been "a new dimension in eye protection."

However, in keeping with American Optical's policy of making good products even better, continual American Optical research and laboratory testing have developed many new improved features on American Optical Ultrascopic Safety Glasses. Now, with these advanced refinements, they are a better buy than ever.

New Wrap-Around Case No. 954 of Cordovan vinyl. Won't wrinkle, peel or crack.

American Optical Fits-On Goggles which protect Ultrascopic Safety Glasses from pitting and scratching.

1. The F9500 Series in copper bronze. This handsome styling will appeal to all and to women workers in particular.
2. The F9500 Series with clear transparent side shields, thus increasing side vision.
3. Spatula tip temples for the F5100 Series without side shields.
4. The F9500 acetate Series is available with metal screen side shields. The F5100 metal series is available with all plastic perforated side shields.
5. Both series are available with 6 curve Plastolite (plastic) lenses.
6. New case with pocket clip (No. C954) and without pocket clip (No. 954) has been developed to accommodate either the metal or acetate goggle without side shields.
7. New Ultrascopic Fits-On Goggles. These are designed to fit either the F5100 or the F9500 Series with or without side shields. Glass or plastic lenses. Glass lenses clear and Calobar ground and polished Meniscus. Plastic lenses, clear or green meniscus. Model 21W for metal safety glasses, model 22W for acetate. 42-44-46-48 mm. eye sizes.
8. Both the F5100 and F9500 series are available with "Balanced Vision" in B glasses. Workers who need correction are assured of balanced or "compensated" vision from lens edge to lens edge.

American Optical
COMPANY
SAFETY PRODUCTS DIVISION

Always insist on AO Trademarked Lenses and Frames. Your nearest American Optical Safety Products Representative can supply you.

SOUTHBRIDGE, MASS., BRANCHES IN PRINCIPAL CITIES

CALENDAR
OF MEETINGS

May 13-15, Rail Steel Bar Association: Annual meeting, Broadmoor hotel, Colorado Springs, Colo. Association's address: 38 S. Dearborn St., Chicago 3, Ill. Secretary: W. H. Jacobs.

May 13-16, National Welding Supply Association: Annual meeting, Mayflower hotel, Washington. Association's address: 1900 Arch St., Philadelphia 3, Pa. Secretary: R. C. Fernley.

May 13-16, American Mining Congress: Coal convention and exposition, Public Auditorium, Cleveland. Congress' address: 1102 Ring Bldg., Washington 6, D.C. Executive vice president and secretary: Julian D. Conover.

May 14-16, Industrial Nuclear Technology Conference: Museum of Science and Industry, Chicago. Sponsors: Armour Research Foundation of Illinois Institute of Technology and *Nucleonics* magazine. Information: Dr. Leonard Reiffel, Armour Research Foundation, 10 W. 35th St., Chicago 16, Ill.

May 15-17, National Association of Sheet Metal Distributors: Spring meeting, Warwick hotel, Philadelphia. Association's address: 1900 Arch St., Philadelphia 3, Pa. Secretary: Thomas A. Fernley Jr.

May 15-17, Radio-Electronics-Television Manufacturers Association: Annual meeting, Sheraton hotel, Chicago. Association's address: 777 14th St. N.W., Washington 5, D.C. Secretary: James D. Secrest.

May 16-17, American Management Association: Special marketing conference, LaSalle hotel, Chicago. Association's address: 1515 Broadway, New York 17, N.Y. Secretary: Andrew P. Donovan.

May 16-17, National Industrial Conference Board: Annual meeting, Waldorf-Astoria hotel, New York. Board's address: 460 Park Ave., New York 22, N.Y. Secretary: Herbert S. Briggs.

May 16-18, New York State Society of Professional Engineers: Engineering industries exposition and convention, Hotel Statler, New York. Society's address: 1941 Grand Central Terminal Bldg., New York 17, N.Y.

May 16-17, National Association of Sheet Metal Distributors: Annual spring meeting, Warwick hotel, Philadelphia. Association's address: 1900 Arch St., Philadelphia 3, Pa. Executive secretary: Thomas A. Fernley Jr.

May 19-22, Industrial Heating Equipment Association Inc.: Semiannual meeting, Homestead, Hot Springs, Va. Association's address: Associations Bldg., Washington 6, D.C. Executive vice president: Carl L. Ipsen.

May 20-23, American Society of Mechanical Engineers: Oil and gas power conference, Kentucky hotel, Louisville. Society's address: 29 W. 39th St., New York 18, N.Y. Secretary: C. E. Davies.

May 20-23, Design Engineering Show: New York Coliseum, New York. Information: Clapp & Poliak Inc., 341 Madison Ave., New York 17, N.Y.

May 21-24, Machinery Dealers National Association: Annual meeting, Grossinger's hotel, Grossinger, N.Y. Association's address: 1346 Connecticut Ave. N.W., Washington 6, D.C. Executive director: R. K. Vinson.

May 22-23, American Iron & Steel Institute: Annual meeting, Waldorf-Astoria hotel, New York. Institute's address: 150 E. 42nd St., New York 17, N.Y. Secretary: George S. Rose.

May 22-24, American Society for Quality Control: Annual convention and exposition, Masonic Temple, Detroit. Information: Andrews, Bartlett & Associates Inc., 1849 W. 24th St., Cleveland 13, O.

May 25-29, Air Pollution Control Association: Spring meeting and exhibit, new Sheraton hotel, Philadelphia. Association's address: 4400 Fifth Ave., Pittsburgh 13, Pa. Executive secretary: Harry C. Ballman.

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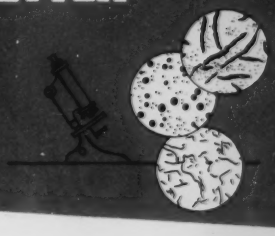
that's why HAMILTON QUALITY CASTINGS ARE BETTER



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elongation
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silicon
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In the heart of the Chicago steel area, Speedomax H 3-Action P.A.T. recording controllers are helping Standard Forgings Corp. turn out quality forgings which range in size from 5 lb. blanks to railroad axles weighing about ½ ton. Subjected to constant and severe vibration from 30 steam hammers and 60 presses for 24 hours a day, 5 days a week, 13 Speedomax H instruments (with five more waiting installation) have been controlling furnace temperatures for over a year with only such routine maintenance as chart changing, etc. And work temperature is held constant within ± 10 F. In both respects, this represents far better performance than the company has experienced before.

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Perhaps Speedomax H can help solve your temperature problems. For further information, contact your nearest L&N office or write 4957 Stenton Avenue, Philadelphia 44, Pa.

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YOU MIGHT AS WELL try to count the beans in a carload as the number of parts that are made of Roebling High Carbon Specialties; Flat Wire and Spring Steel. These Roebling products are unsurpassed for mechanical and dimensional uniformity . . . for speeding manufacturers' production and cutting costs.

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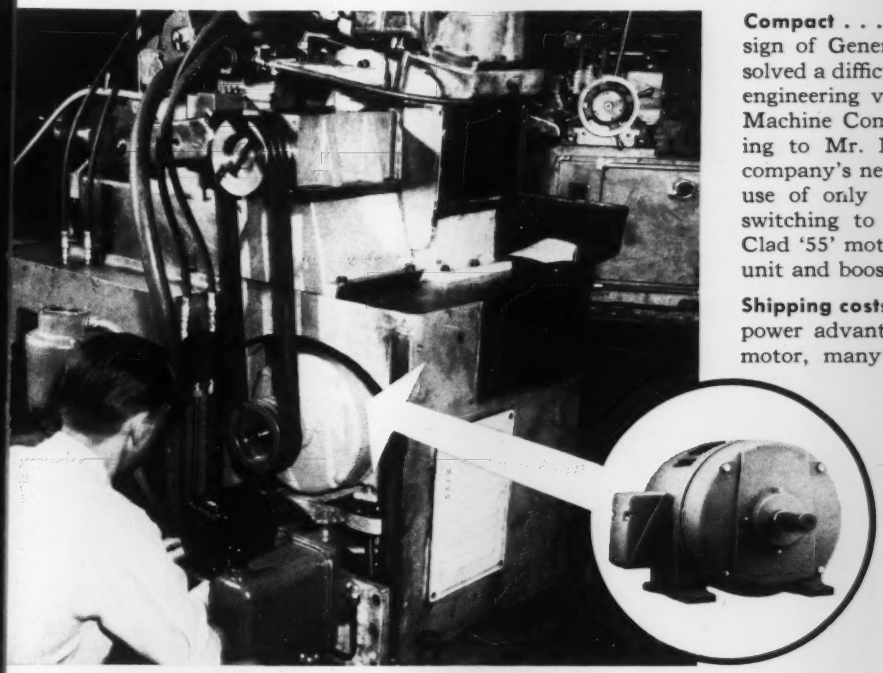

Compact . . . power-packed—The compact design of General Electric's Tri-Clad '55' motor solved a difficult power problem for Roger Pyne, engineering vice-president of the Van Norman Machine Company, Springfield, Mass. According to Mr. Pyne, "space limitations on the company's new centerless grinder permitted the use of only a 5-hp conventional motor. By switching to the smaller, more compact Tri-Clad '55' motor we were able to go to a 7½-hp unit and boost our grinder's capacity by 50%."

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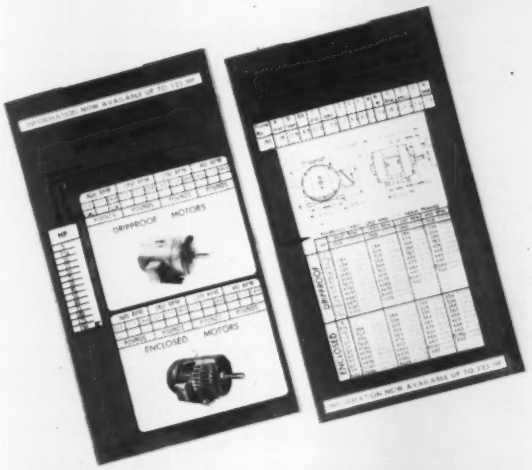

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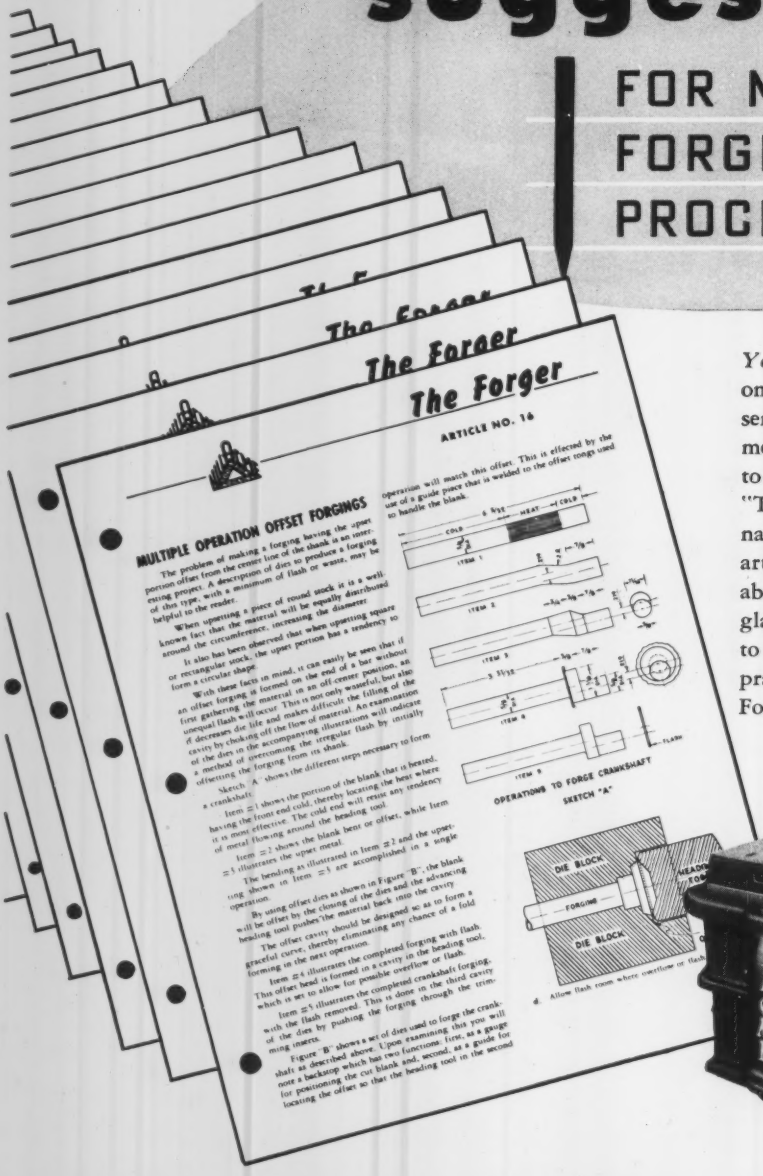

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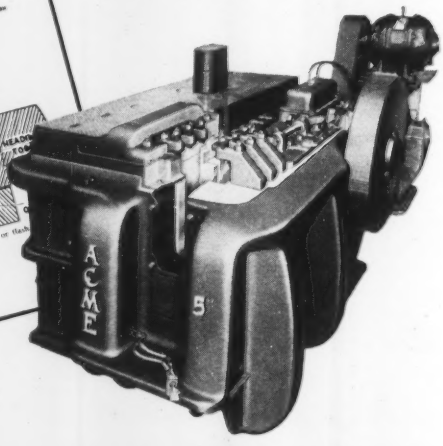

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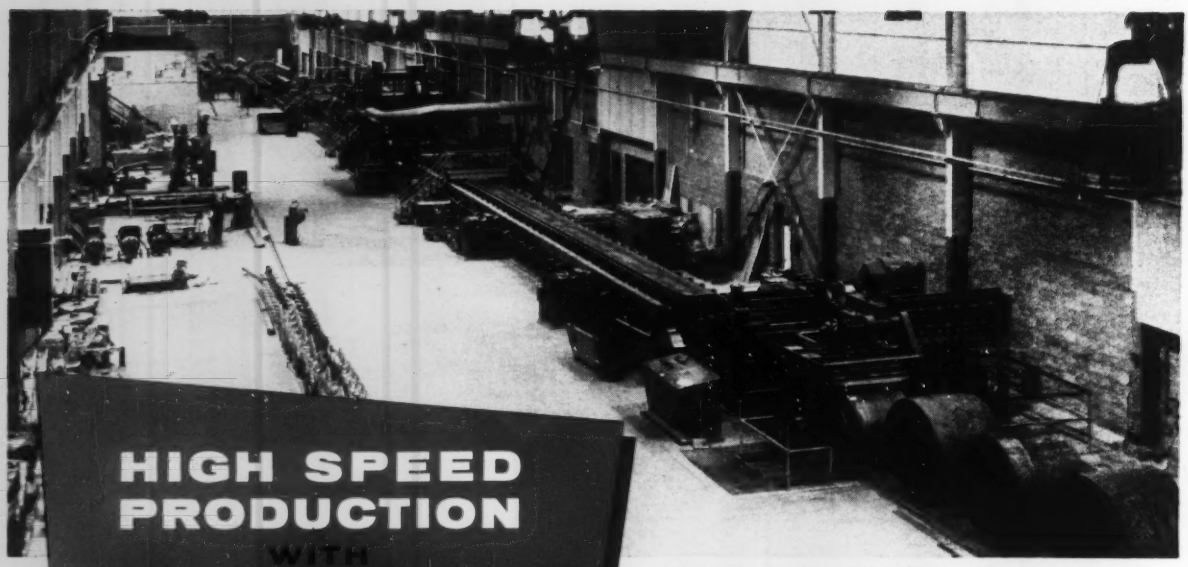

HIGH SPEED PRODUCTION WITH RELIANCE V★S DRIVES

Six Reliance V★S Drives make it possible to operate this complete line as if it were a single machine.

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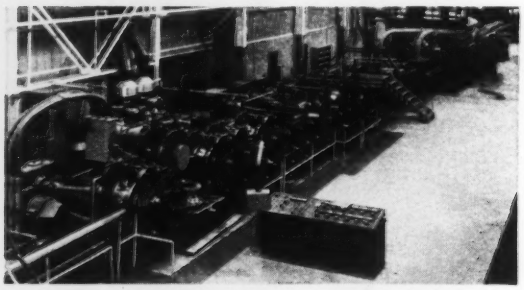
A team of Reliance Application Engineers, working with the machinery builder, built this specialized drive. This team knows the processes of the steel industry and how to handle the problems involved. Engineering knowledge, backed by the quality of Reliance products, supplied this accurate, simple-to-operate, economical drive.

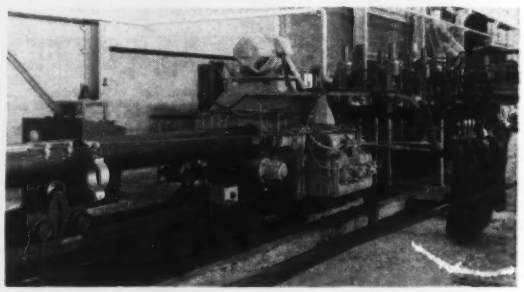
The Reliance Application Engineering Department builds drives for every industry. A team of engineers who are experts on your industry's operation, stand ready to engineer and build the drive for your particular needs.

If you would like more information on this installation, write for Bulletin L-2505.

L-1541



The welding section operator controls the speed of the entire line from this Reliance Pendent Station.



The Reliance V★S Drive on this flying cutoff automatically measures the pipe and controls the movement and speed of the carriage.

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FOR CORROSION RESISTANCE. If you're a photographer, you know that hypo is awfully corrosive. This print washer (it holds 75 8x10 prints in one loading) is made completely from Stainless Steel by the Arkay Corporation, in Milwaukee. For proof that Stainless is easy to fabricate, notice that the drum has 1,700 perforations, and double lockseam soldered joints are used throughout.

FOR TAKING A BEATING. These supermarket check-out counters are made from USS Stainless Steel. They withstand the pounding of heavy containers and are unaffected by corrosive meat and produce juices. It only takes 20 minutes for one girl to clean all eleven counters shown here. The Robert Becht Company of Cincinnati made them.

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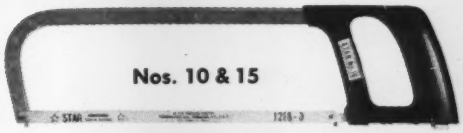
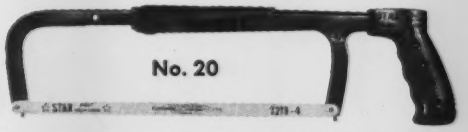


Nos. 10 & 15

No. 10—Green molded handle. Almost indestructible. Shaped for comfort. Patented Lever-Lock positions, tensions blades automatically. **No. 15**—Red molded handle, chrome-plate finish. Same features as No. 10.



No. 20

Long a favorite with mechanics, this gunmetal finish adjustable pistol-grip frame with lever for lock blade features extra easy blade change.

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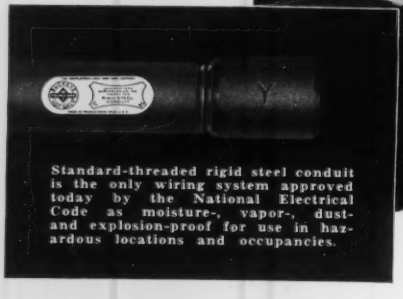

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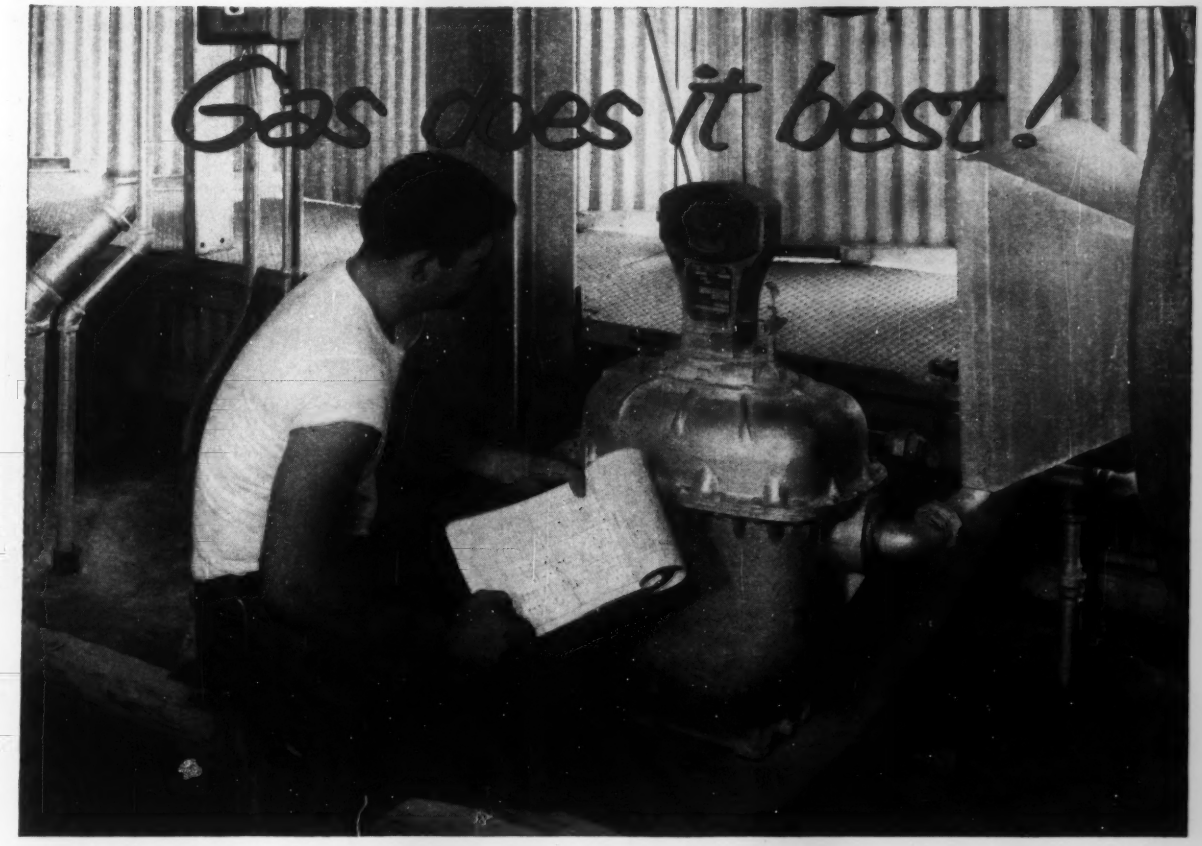

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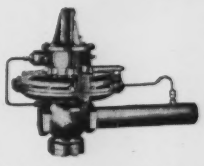

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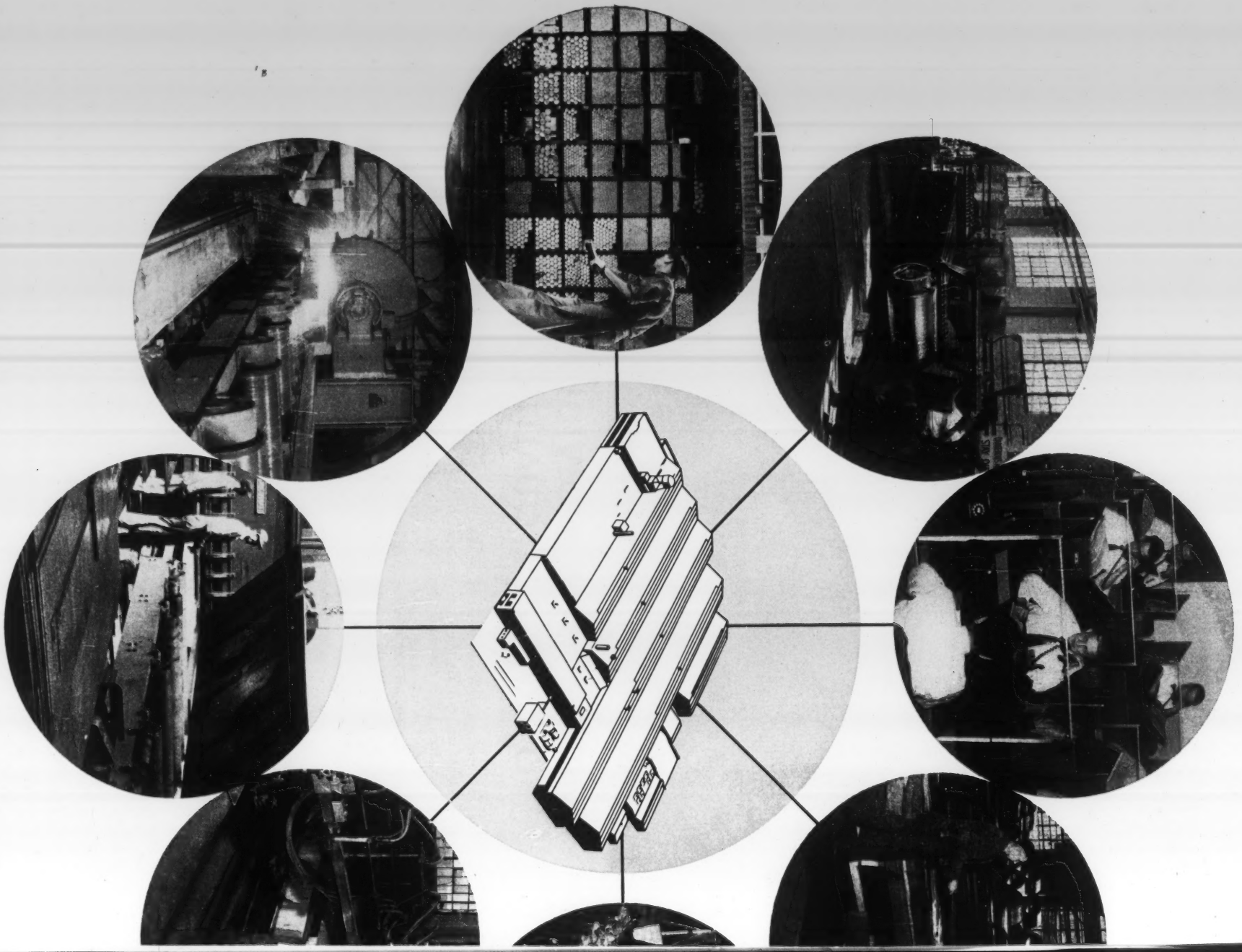
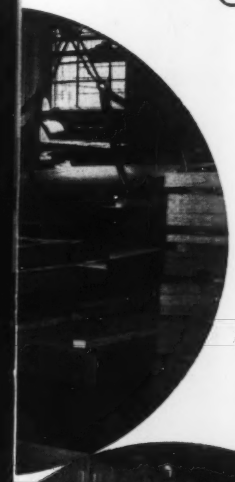


"The Department Store of Steel"

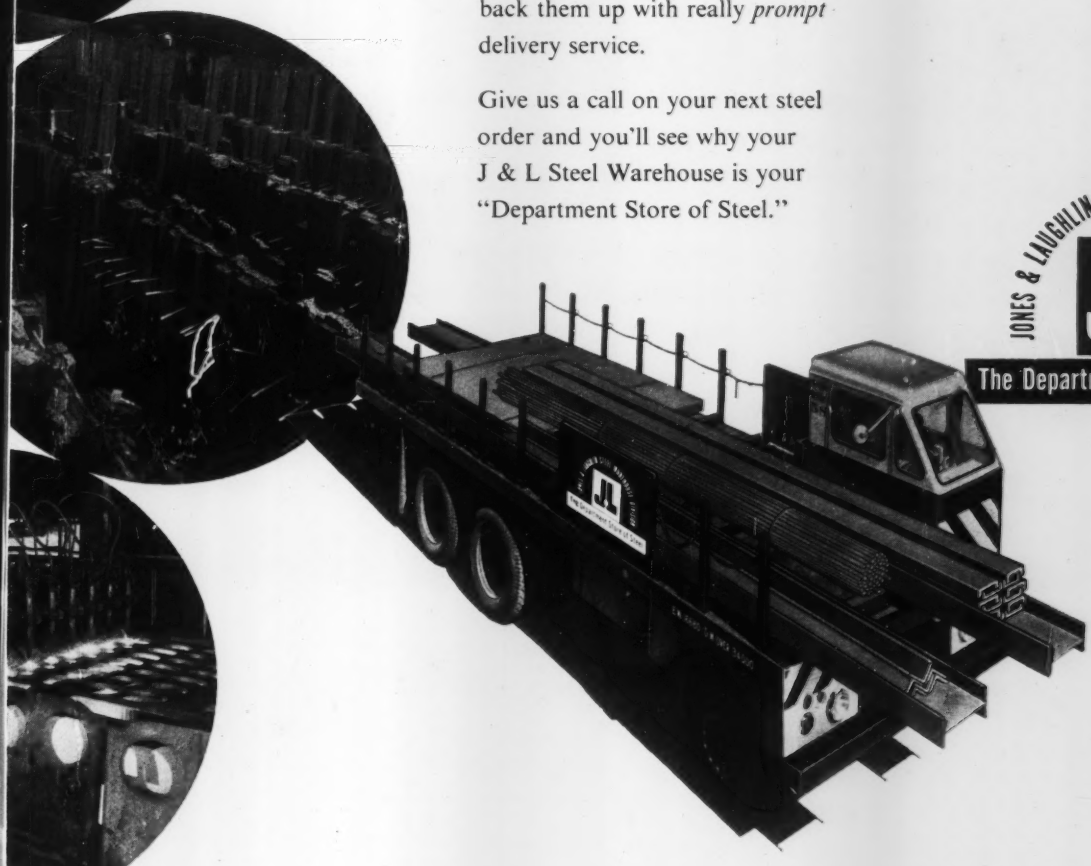
Call Your J & L Warehouse for Fast Steel Service



It takes a combination of many things to make a warehouse a "department store of steel."

First of all, it takes steel—in a wide range of sizes, shapes and analyses. Next it takes processing facilities and equipment—modern and complete. Then add people—trained, experienced and service minded people. Finally, back them up with really *prompt* delivery service.

Give us a call on your next steel order and you'll see why your J & L Steel Warehouse is your "Department Store of Steel."



JONES & LAUGHLIN STEEL WAREHOUSE DIVISION

The Department Store of Steel

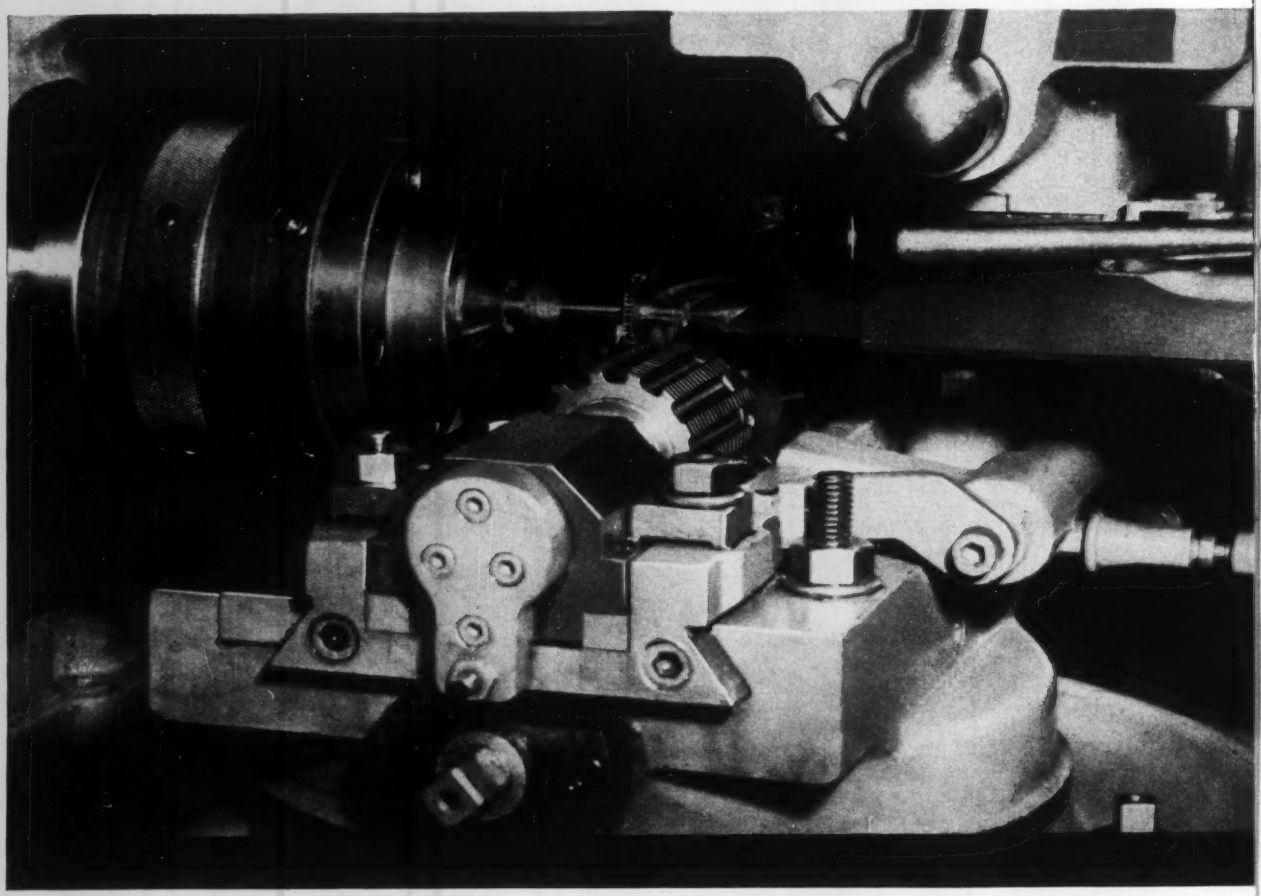
J & L Steel Warehouse Division

DIVISION OFFICES INDIANAPOLIS 7, INDIANA

CHICAGO · CINCINNATI · CLEVELAND · DETROIT · HAMMOND · INDIANAPOLIS · LANCASTER
LOUISVILLE · MEMPHIS · NASHVILLE · NEW ORLEANS · NEW YORK · PITTSBURGH

HOBBING PRECISION GEARS

within precision Class 2 AGMA tolerances.....



Fine-pitch instrument gears are cut on Barber-Colman Precision No. 6-10 Hobbing Machines at Belock Instrument Corporation. For their most accurate gears, Belock uses Barber-Colman Class AA hobs exclusively.

with standard-type precision hobbing machines

The Belock Instrument Corporation manufactures complex electronic and electromechanical systems and components. The constant demand placed on them for greater accuracy in these instruments requires all gears to be cut to very close tolerances and yet be completed on a practical production basis.

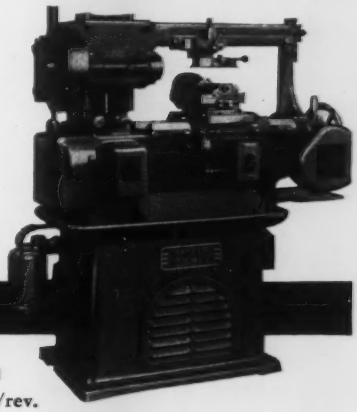
Belock hobs such gears consistently within Precision Class 2 AGMA tolerances, using a battery of *standard-type* Barber-Colman Precision No. 6-10 hobbing machines. These are unusually close tolerances and the use of *standard-type machines* for these gear accuracies is a good reason for taking a close look at the elements and methods they employ.

here's how they do it:
Gear blanks are machined to Precision AGMA tolerances. Then, for maximum accuracy in hobbing all precision gears, Barber-Colman Class AA single-thread ground hobs are used. These hobs are manufactured with tapered bores, since taper-bore hobs can, with greater ease, be mounted more accurately on the hob arbor to eliminate runout. These hobs are resharpened to original class AA accuracy using a Barber-Colman No. 6-5 Hob Sharpening Machine.

The gears are finish-hobbed on Barber-Colman Precision No. 6-10 Hobbing Machines. These machines hold a precision relationship between the rotation of the work and the rotation of the hob which allows them to consistently hob gears to these fine tolerances.

Barber-Colman Precision No. 6-10 Hobbing Machines are built with large precision index worm gears and single-thread worms for maximum tooth spacing accuracy. All vital machine parts are specially selected for close tolerances.

If you have a problem of producing consistent accuracy in gear cutting, consult Barber-Colman Hobbing Engineers for assistance. They can help you obtain any class of accuracy you desire with the most practical equipment for doing it.



this is an actual production record:

GEAR	HOB	OPERATION
Diametrical Pitch — 64	Class AA Ultra-Precision	Feed — .015"/rev.
Pressure Angle — 20°	2" Diameter, Taper Bore	Speed — 120 sfm
Outside Diameter — .7812"	Pieces per Sharpening — 720	
Pitch Diameter — .7500"	Stock Removal per Sharpening — .005"	
Face Width — .093"		
Material — 303 Stainless, 30-35 RC		

BARBER-COLMAN COMPANY

635 ROCK STREET • ROCKFORD, ILLINOIS

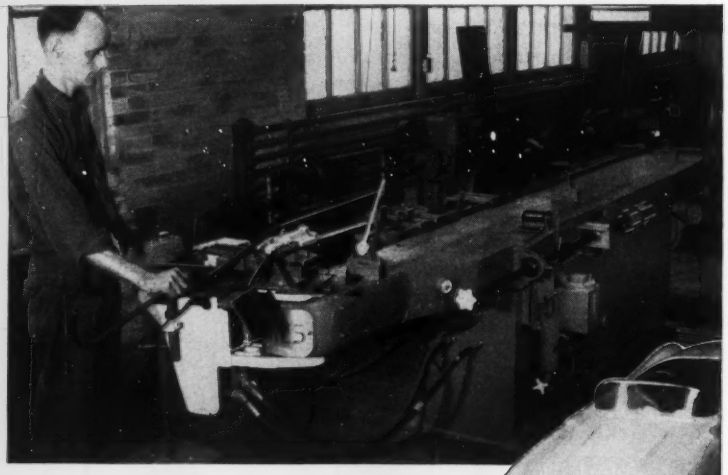
Hobs • Cutters • Reamers • Hobbing Machines • Hob Sharpening Machines

BARBER COLMAN

NET PRODUCTION

840 Bends Per Hour

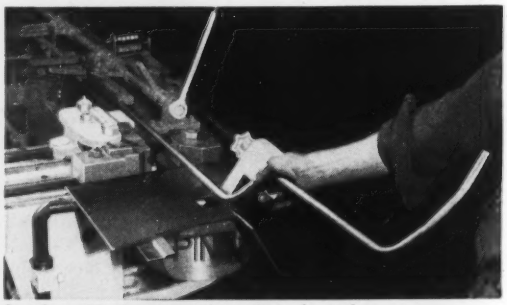
With PINES HYDRAULIC BENDER



Over-all view of Pines Size ¾ Bender at Flexsteel Spring Division used for outside job work as well as for their own manufacturing needs. Application illustrates setup for bending long side members for toy Corvette car.

Automatic Cycling Speeds Job Work for Flexsteel Spring Division - Dubuque, Iowa

Here's another typical example of fast, efficient production bending illustrating the outstanding advantages of automatic cycling, a standard feature on most Pines machines. Flexsteel Spring Division, Northome Furniture Industries, Dubuque, Iowa, used this set-up to produce frames for a toy Corvette car from 5/8" 18-gauge welded steel tubing. Records show that over a period of three months, net production on workpiece illustrated averaged 140 pieces (840 bends) per hour. On this job requiring six bends of the same radii (1 13/16"), the operator simply positions the tubing for each bend and presses the forward button. Pre-set indexing stops automatically control the angle for each bend in sequence while the operator rapidly positions the workpiece. Automatic cycling saves valuable production time and accounts for the high efficiency rate maintained.



Simple positioning gauge determines plane of each bend. View shows position for making sixth bend for right-hand frame member. Both right-hand and left-hand members are produced on same setup.

Accuracy Maintained at High Production Speeds

Another well-known advantage of Pines machines is their ability to maintain accuracy. Tolerances of .030 to .040 at several check points are commonly held without difficulty, simplifying welding, assembly, or other fabricating operations. In addition, all Pines machines are designed for small radius bending with mandrels, as well as for bends of the type illustrated not requiring mandrels. For accuracy and efficiency, it will pay you to specify Pines.

PINES ENGINEERING CO., INC.

Specialists in Tube Fabricating Machinery

662 WALNUT • AURORA, ILLINOIS

PRODUCTION BENDING • DEBURRING • CHAMFERING MACHINERY

WRITE FOR *Free* DATA SHEETS

Ask for up-to-date case study material on production bending the "Pines-Way." Full information available, including tooling and setup data used for producing steel channels, rods, extrusions, pipe, and tubing. Or for assistance on any job, ask for a Pines sales engineer to call.

You buy near-perfection when you specify this Jessop steel

If you visit the Jessop Specialties Division, you'll be immediately impressed with the clean, quiet lab-like atmosphere, the intensity of effort and care that personifies true craftsmanship. For here Jessop processes fine *Truform* oil or *Windsor* air hardening tool steel into one of its top products . . . precision ground flat stock used for the production of highly accurate dies, gages, cutters, machine parts, straight edges or the like. This Jessop product comes as close to perfection as the steelmaker's art logically allows. Each piece, of any size, is highly-finished, dead flat and square, and guaranteed to have a thickness tolerance of plus or minus .001 and a width tolerance of plus .005, minus .000. An inspector double checks the analysis with a delicate Magnetic Analysis Production Comparator and a Profilometer is used for inspection of the finish. After all tests are passed, the stock is carefully wrapped for shipment to Jessop customers all over the world. If you have any application for this type of product, it will pay you to send in an inquiry. Jessop's pride of accomplishment will make it a better buy for you.

JESSOP

STEEL COMPANY • WASHINGTON, PA.

OFFICES IN PRINCIPAL CITIES

Jessop Steel of Canada Limited, Wallaceburg, Toronto

Jessop Steel International Corp., Chrysler Building, New York, New York

. . . how else could this job be handled so well?

Through exclusive features like these a Gerlinger fork lift truck enables each operator to multiply "manpower" and give you a new concept of profitable mass-handling:

- Exclusive Floating-Type Boom Action—faster, friction-free lift
- Counter-active Weight Distribution—better traction and maneuverability
- Pivotal Mounted Steering Assembly—stabilized load on any road
- Heavy-Duty Steel Channel Frame—bonus years of reliable service
- Maximum-Power Torque Converter Drive—smoother operation, less wear

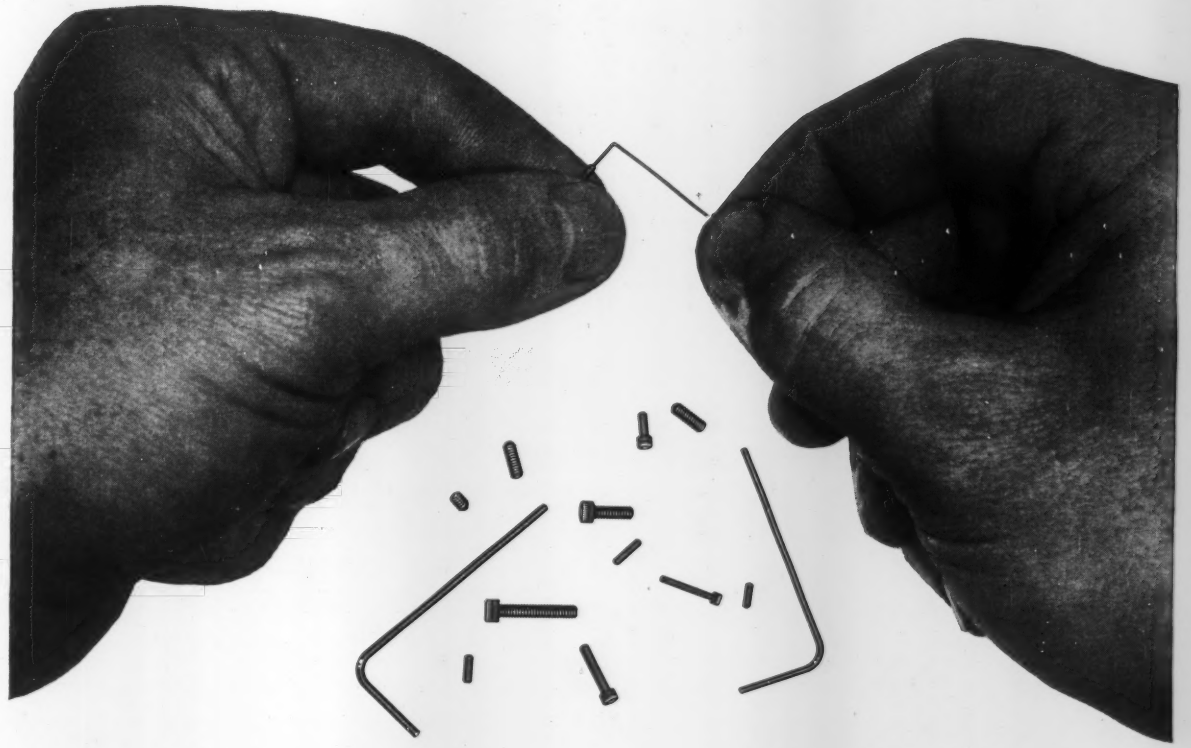
If you move and stack loads between a few hundred pounds and twenty tons, look to the combined Towmotor-Gerlinger line to meet the most diversified specifications. This great new combination brings you the most complete range of fork lift truck capacities available from one source. More extensive service to match it, too.

Get catalog describing the lift trucks that will do the best job for you. Address: Gerlinger Carrier Co., Dallas, Oregon.

Leaders for 38 years in building Fork Lift Trucks and Carriers

TOWMOTOR THE ONE-MAN-GANG ® -GERLINGER

Gerlinger Carrier Company, Dallas, Oregon is a subsidiary of Towmotor Corporation, Cleveland, Ohio



If you're miniaturizing . . . you'll save space, time and money with Allen Minicaps and Minisets (#0 thru #3 dia.)

These miniature Allen Hex Socket Cap and Set Screws will let you scale down your product sizes even farther. They're made from Allenoy special alloy steel — so strong that you can safely specify fewer screws or smaller sizes.

Allen Minicaps and Minisets are tiny, but very tough! — true Allens, with deep, clean, strong sockets and uniform Class 3A threads. Minicaps have the Allen knurled "Grip-Head" and are trimmed both on top and *under* the head, for tighter fit and better appearance. Minisets have the improved small-cup Allenpoint that drives deeper and holds tighter.

Because sockets are uniformly true hexagon shape, the key of driver fits tight — makes starting much easier, saves a lot of time in assembly.

Diameters of these miniatures run from #0 through #3. Minicap lengths run from ⅛" through ½", and Miniset lengths from 1/16" through ¼". Also standard in stainless steel. Your Industrial Distributor has them now. He'll show you why these Allens — like all Allens — hold tighter and last longer. Or write for information and samples.

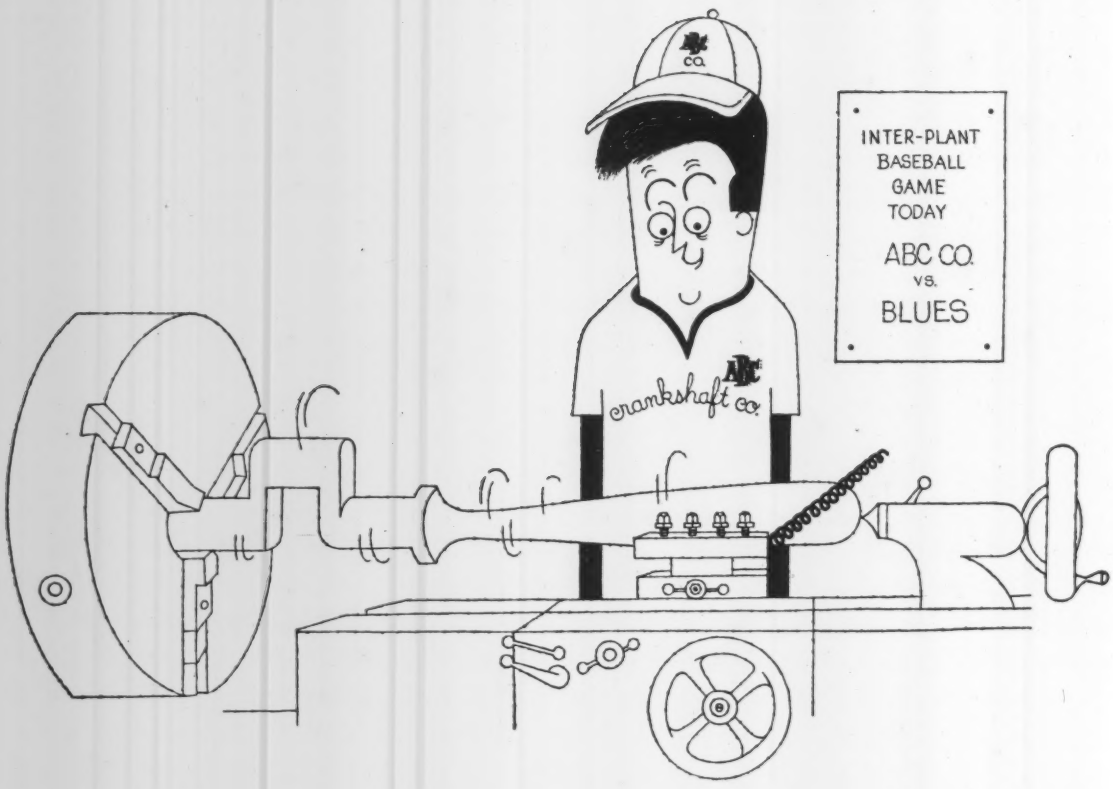
Use Minicaps and Minisets wherever you need dependable fastening in very small assemblies:

TV, radio and telephone equipment • Guided missiles, rockets • Panel meters • Electro-mechanical devices and servo-systems • Computers • Control and operating mechanisms for relays • Cameras • Instruments

Stocked and sold by leading industrial distributors everywhere

ALLEN MANUFACTURING COMPANY
Hartford 2, Connecticut, U.S.A.

ALLEN HEX-SOCKET SCREWS HEAD



Have a metal turning problem?

THE SOLUTION MAY BE A FAMOUS REX HIGH SPEED STEEL. REX IS THE STANDARD BY WHICH ALL HIGH SPEED STEELS ARE COMPARED — AND IT'S AVAILABLE FROM ALL LOCAL CRUCIBLE WAREHOUSE STOCKS.

Crucible REX M2-S, for example, has a wide hardening range. Although REX M2-S costs less, its red hardness is equal to the 18-4-1 type. And its superior toughness and good wear-resistance help make it ideal for many cutting, turning and broaching operations.

REX is just one of dozens of tool steel grades and types regularly stocked at all local Crucible warehouses.

What's more, Crucible warehouse service offers you unlimited assistance in selection or fabrication of special steels. And Crucible is the only specialty steel producer *fully integrated to the point of use*. That means control and responsibility from raw material to warehouse delivery to you.

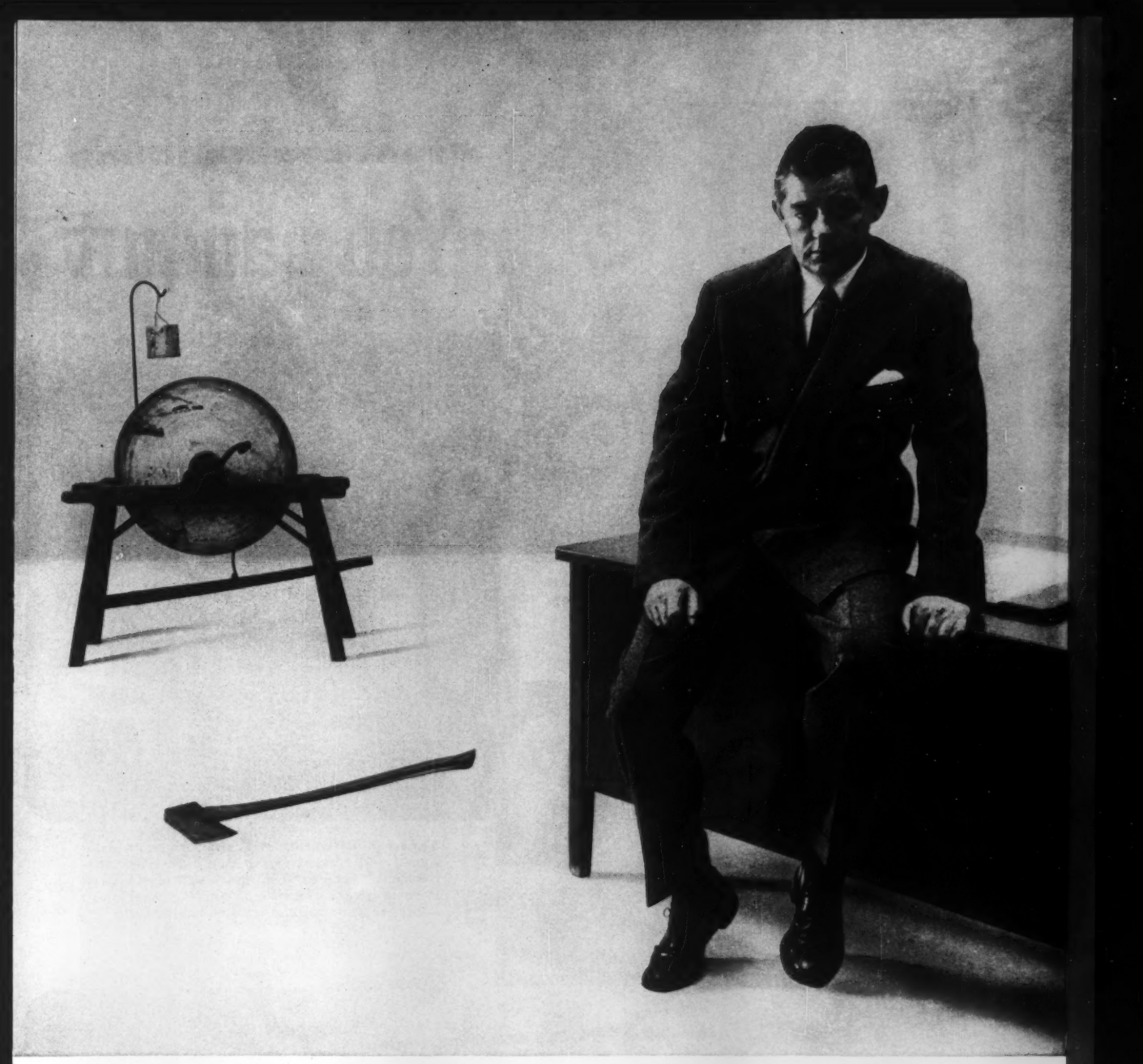
STOCKS MAINTAINED OF:
Rex High Speed Steel . . . ALL grades of Tool Steel (including Die Casting Die and Plastic Mold Steel, Drill Rod, Tool Bits, and Hollow Tool Steel Bars) . . . Stainless Steel (Sheets, Bars, Wire, Billets, Electrodes) . . . Max-el, HY-Tuf, AISI Alloy . . . Onyx Spring, Hollow Drill Steel and other special purpose steels.

See us at N.A.P.A. Inform-A-Show
Atlantic City, May 26-29. Booths 1, 2, 3, 4.

CRUCIBLE WAREHOUSE SERVICE

Crucible Steel Company of America

General Sales Offices, The Oliver Building, Mellon Square, Pittsburgh 22, Pa. Branch Offices and Warehouses: Atlanta • Baltimore Boston • Buffalo • Charlotte • Chicago • Cincinnati • Cleveland • Dallas • Dayton • Denver • Detroit • Grand Rapids Harrison • Houston • Indianapolis • Los Angeles • Milwaukee • New Haven • New York • Philadelphia • Pittsburgh • Portland, Ore. Providence • Rockford • San Francisco • Seattle • Springfield, Mass. • St. Louis • St. Paul • Syracuse • Toronto, Ont.



"We grind no axe... and really have no need to." After all, Bliss makes so many types and sizes of metalworking presses—actually many more than any other builder—that we favor only the one right press for your job. It may be a big one, a little one, a mechanical, a hydraulic, a standard or a special. But you can be sure it will be the *right* one.

If you have a pressed metal problem, isn't it logical to talk to a source that's certain to give you an impartial answer? To talk to Bliss?

BLISS
SINCE 1857

E. W. BLISS COMPANY · Canton, Ohio

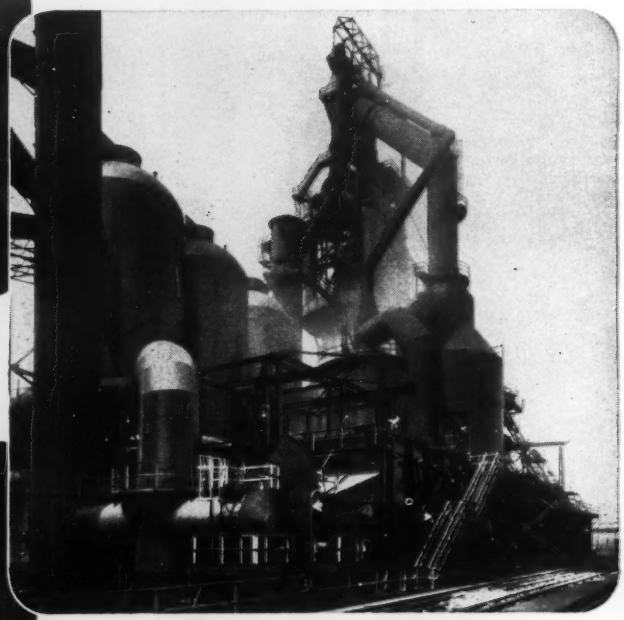
100 years of making metal work for mankind

PRESSES • ROLLING MILLS • MILL ROLLS • DIE SETS • CAN MACHINERY • ORDNANCE

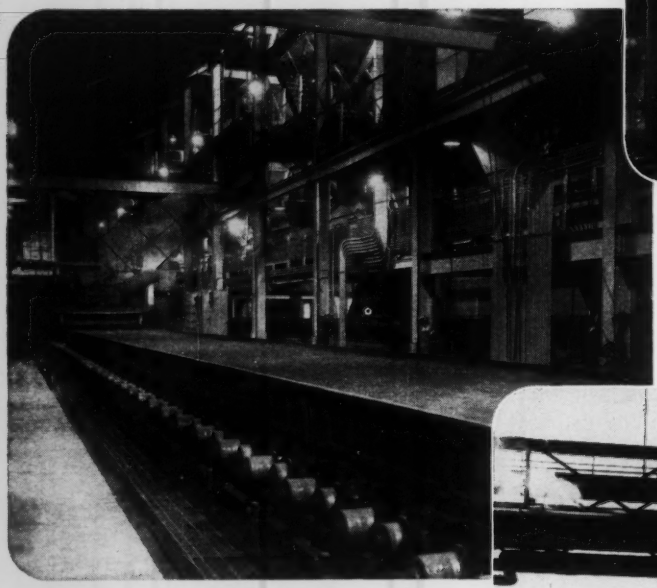
From ore-handling

You can put

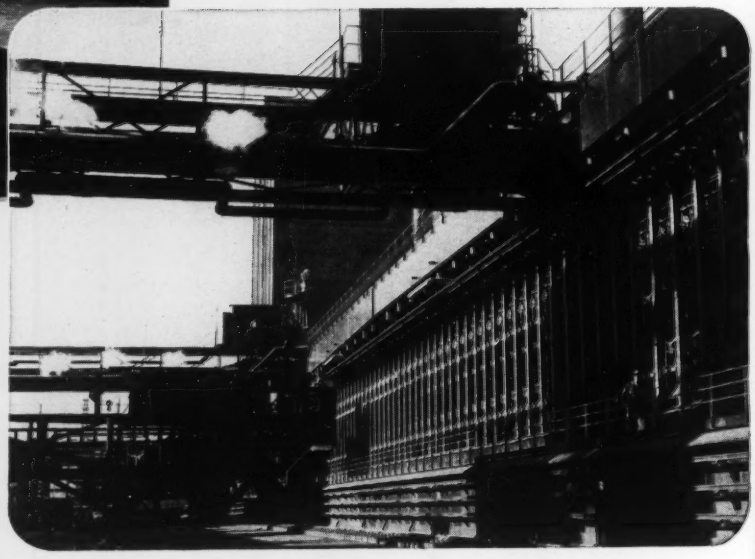
This ore-handling system was installed by Koppers for Great Lakes Steel Corporation in 1956 to speed up unloading of ore boats. Its capacity is 1,250 tons of ore an hour.



Biggest in the world, "A" blast furnace was designed and erected for Great Lakes Steel Corporation by the Freyn Department of Koppers. It has a hearth diameter of 30 feet, 3 inches . . . a total interior volume of 64,435 cubic feet.



8-foot-wide sintering machine, designed and constructed for Weirton Division of National Steel in 1955. This machine produces over 2,500 net tons of blast-furnace sinter a day. Now, Koppers Freyn Department is building two complete sintering plants—each with a 12-foot-wide machine—for National Steel Corporation.



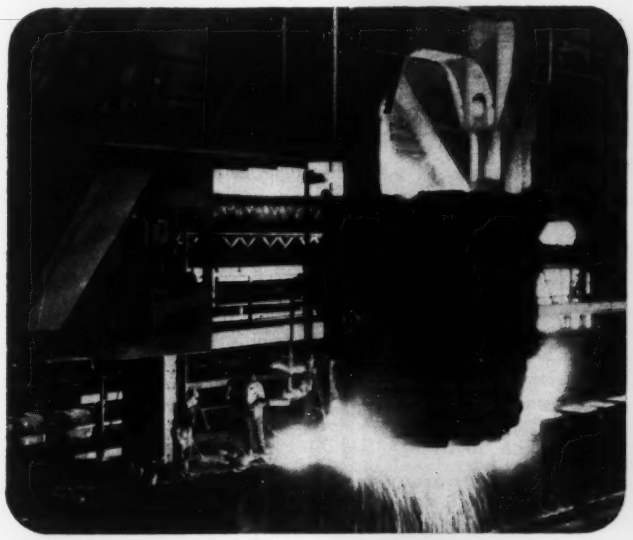
87 Koppers-Becker Coke Ovens, installed by Koppers Coke Plant Department in 1956 for Inland Steel Company's Indiana Harbor Works. This battery carbonizes 1,920 net tons of coal per day and is similar in design to an earlier battery of 65 Koppers Coke Ovens built in 1950.

to finished steel . . .

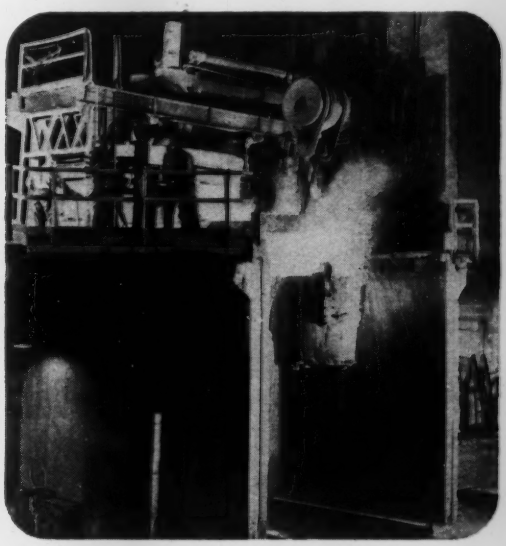
Koppers experience to work in your steel plant

For almost 50 years, Koppers has been designing, engineering and building steel plant installations. Koppers experience covers every step from original planning to final operation of materials handling systems, sintering plants, coke plants, blast furnaces and blast furnace equipment, open-hearth, electric-furnace and converter shops, rolling mill shops, and gas cleaning installations.

Put this experience and proved ability to work for your company. Call on Koppers next time *you* plan to build . . . rebuild . . . or expand. Koppers Company, Inc., Engineering and Construction Division, Pittsburgh 19, Pa.



This open-hearth shop, with eight furnaces, was designed and engineered for Youngstown Sheet & Tube Company by the Freyn Department of Koppers. Rated annual ingot capacity of the furnaces is 1,776,000 net tons. Koppers also designed a complete slabbing mill for this same company.

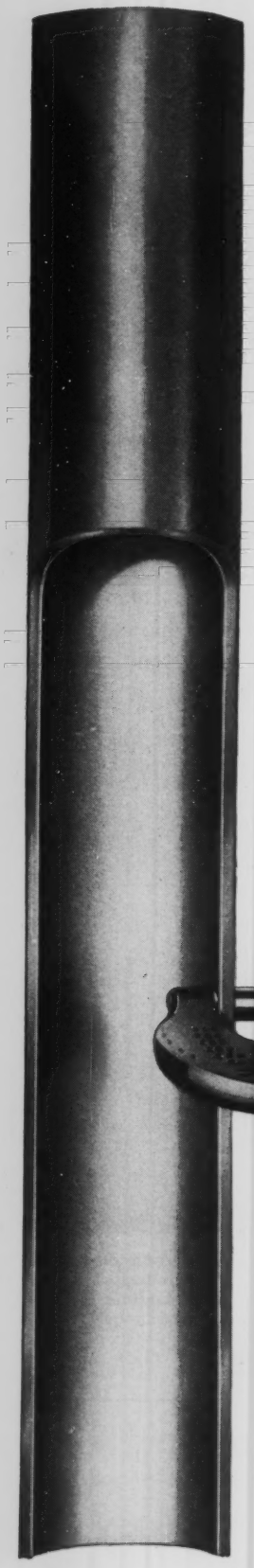


Electric-furnace shop, engineered and built in 1952 by Koppers Freyn Department to produce stainless and specialty steels for Allegheny Ludlum Steel Corporation at Watervliet, New York.

KOPPERS

KOPPERS

ENGINEERING AND CONSTRUCTION

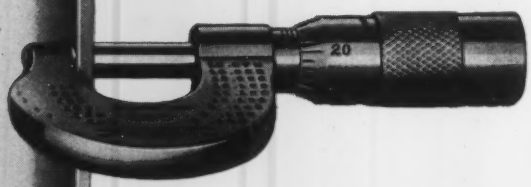


CYLINDER TUBING

..."mirror-finished" by Standard

Standard "mirror-finished" cylinder tubing is full-finished to use without further sizing or finishing for such applications as *automobile shock absorbers, power steering* and *hydraulic pumps.* When it comes to punishment, it can really take it. Every inch of this rugged tubing measures up to exacting specifications in cylinder finish . . . in ID tolerances as close as .001" . . . in extreme uniformity of wall thickness and concentricity . . . in internal pressure resistance, *tested to shocks up to 9000 p.s.i.* Cylinder sizes to 3" OD x .165" wall. For full information on Standard's complete range of products, plant facilities and engineering assistance send for *free* folder below.

- **Welded Stainless Tubing and Pipe.**
- **Welded Carbon Steel mechanical.**
- **Boiler and Heat Exchanger.**
- **Exclusive rigidized pattern.**
- **Special Shapes**



Shock absorber with metal-to-metal plunger in cylinder tube held to .001" ID tolerance. "Mirror-finish", concentricity and precision tolerance makes Standard cylinder-grade tubing usable *as is* for hydraulic and other cylinders.

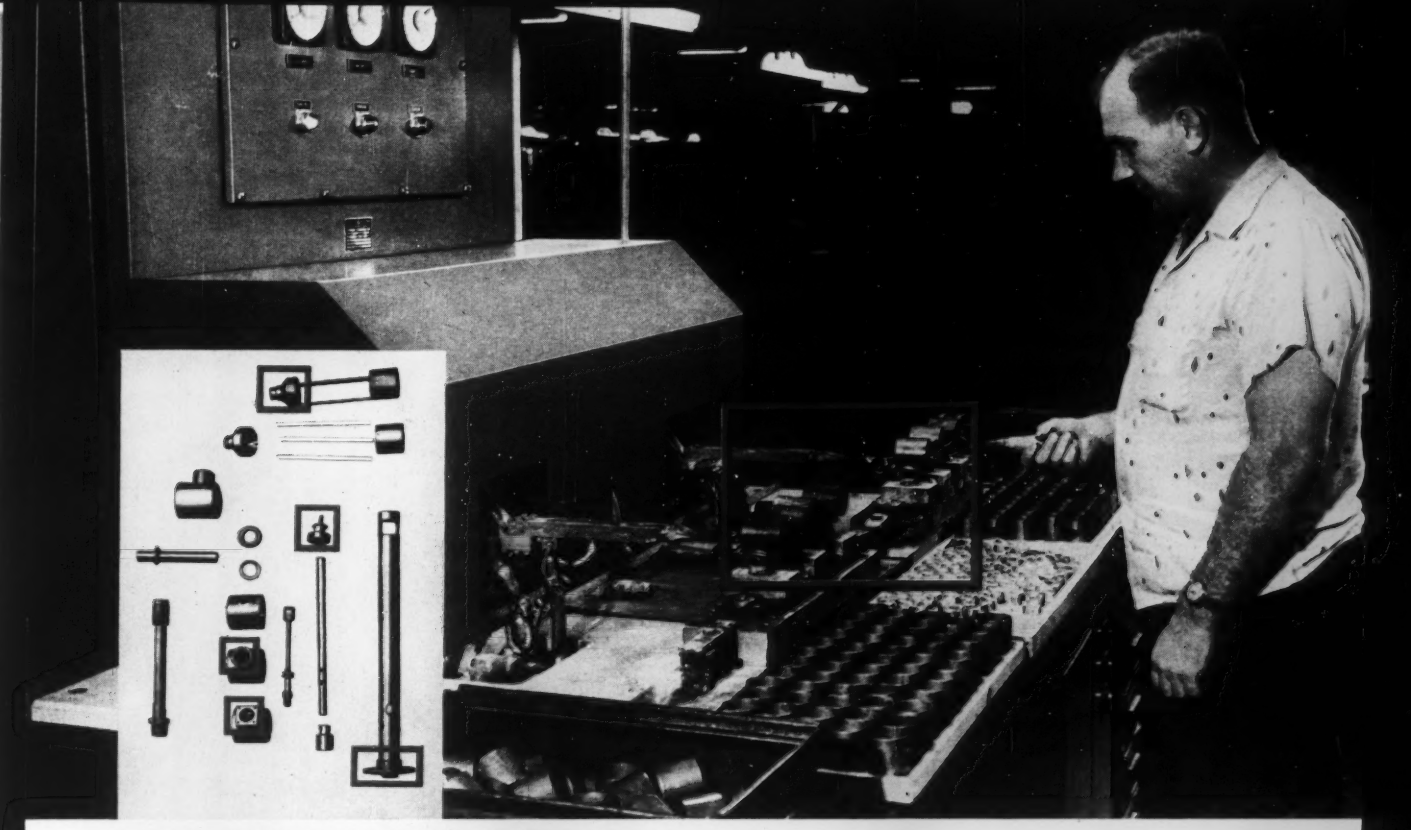
Free 8-page folder on all Standard products. Write to address below.

STANDARD

THE STANDARD TUBE COMPANY

24400 PLYMOUTH ROAD • DETROIT 39, MICHIGAN

Welded stainless tubing and pipe • Welded carbon steel mechanical • Boiler and Heat Exchanger • Exclusive rigidized patterns • Special Shapes • Steel Tubing—Sizes: ½" OD to 5½" OD —.028 to .260 wall • Stainless—Sizes: ¼" OD to 4" OD—.020 to .154 wall.



AT HARTFORD MACHINE SCREW CO.—

General Electric induction heaters braze 20 different parts, help cut rejects 91%

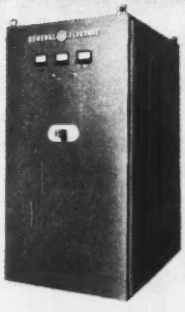
At Hartford Machine Screw Co., a General Electric electronic induction heater is used for brazing a wide variety of parts for electric-switch housings and jet engines.

The General Electric unit takes on jobs ranging from ¼-inch to 1½-inch tubing. After brazing, each part undergoes a regular 500-pound pressure test, and the aircraft work must pass radiographic inspection. With the General Electric induction heater, rejects have been reduced 91 per cent, from 30-35 per cent to a maximum of two per cent.

"If we need another induction heater, it definitely will be a General Electric," says A. O. Haversat, plant engineer. "The output control alone makes it virtually a MUST. This feature is just what we need for our kind of production. It eliminates guesswork and costly human errors. And it cuts out excess tooling, while still assuring uniform brazing."

General Electric electronic induction heaters are available in four ratings—7½-15-, 25-, and 40-kw, with a choice of four different models in each rating. The four models provide various control combinations, so you can buy the one induction heater which best matches your production pattern from the standpoint of both rating and control.

For more information, send in the coupon below or contact your nearby General Electric Apparatus Sales Office.



Four models in each of four ratings; 7½ Kw, 15 Kw, 25 Kw, and 40 Kw.

General Electric Co.
Section 722-6
Schenectady, N. Y.

PLEASE SEND ME A COPY OF BULLETIN GEA-6388

NAME_____

COMPANY_____

STREET_____

CITY_____ STATE_____

GENERAL ELECTRIC

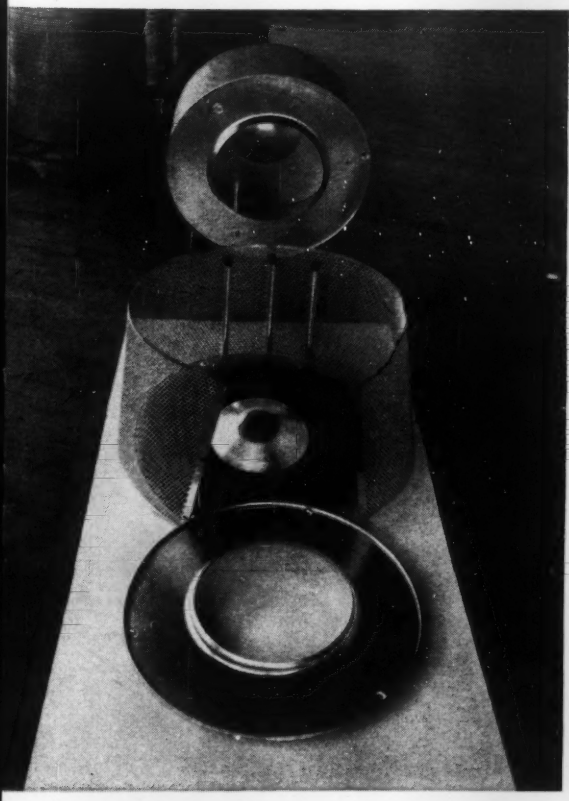
SIX-GOAL MAN FAILS TO FLAKE TI-CO®

Captain Pat Conners, six-goal man and captain of one of the Midwest's top polo teams, the Shamrocks, examines unflaked sheet of TI-CO after his repeated drives of a polo ball driven into it at 85 mph.

Not many applications require TI-CO's coating to withstand punishment equal to the 85 mph slam of a polo ball. But, you can see how this unusual test does demonstrate the ability of TI-CO to take the toughest fabricating operations . . . stamping, drawing, crimping, lock-seaming, brake forming . . . without cracking or flaking of the zinc coating.

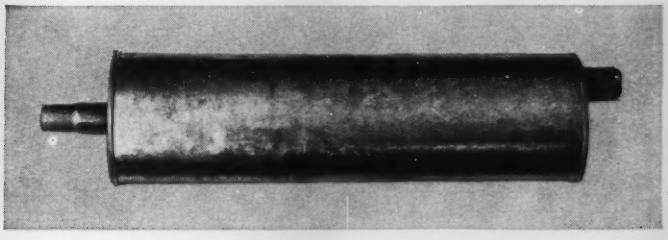
TI-CO's secret is in the patented Sendzimir process which produces a galvanized sheet with a tightly adhering zinc coating that "flows" with the base metal as it is being fabricated. In stamping and other forming operations, non-flaking TI-CO eliminates costly down time and clogging of machines.

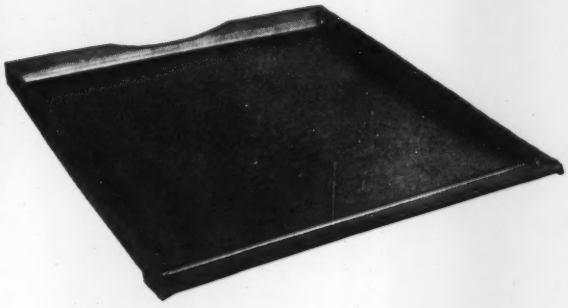
Corrosion resistant TI-CO adds saleability to top brand appliances and auto parts



This is the assembly for the inner drum of a popular brand automatic clothes dryer. When the manufacturer started using Inland TI-CO on this application he added the very important sales advantage of corrosion resistance. The tightness of the zinc coating on TI-CO Galvanized Sheets makes possible tough fabricating operations, such as the punching on the basket of this washer drum, without danger of flaking or peeling. Conventional pot galvanized sheets couldn't take it.

Automobile mufflers are subjected to severe corrosive conditions. Rapid temperature changes produce condensation inside the mufflers. Weathering goes on constantly outside. The manufacturer of this muffler gained superior durability and resistance to corrosion and weathering when he started using Inland TI-CO Galvanized Sheets. The life of the finished product was extended and saleability was increased.





This front panel of the cabinet for a leading automatic washer, as well as the complete wrap-around itself, is made from Inland TI-CO Galvanized steel. Why? Because at very little additional cost over ordinary steel the manufacturer added a demonstrable sales feature . . . protection against corrosion. TI-CO takes the sharp draw on the corners of this panel without flaking. The zinc coating stays put . . . maintaining over-all protection.

If you manufacture a product that could profit from this sales feature of built-in resistance to corrosion, even though its forming operations require superior ductility . . . it will pay you to investigate non-flaking Inland TI-CO Galvanized Sheets.

TI-CO galvanized sheets are now more readily available!

The terrific demand for this high quality sheet has kept TI-CO in short supply since its development. Now, additional production facilities have been completed making greater quantities available.

TI-CO is available in cut sheets or coils, in gages 8 to 30 inclusive and widths as great as 60 inches. TI-CO comes with dry, oiled or chemically treated surfaces. Consult your Inland representative for your requirements.

INLAND STEEL COMPANY

38 South Dearborn Street • Chicago 3, Illinois

Sales Offices: Chicago • Milwaukee • St. Paul • Davenport St. Louis • Kansas City • Indianapolis • Detroit • New York

INLAND TI-CO

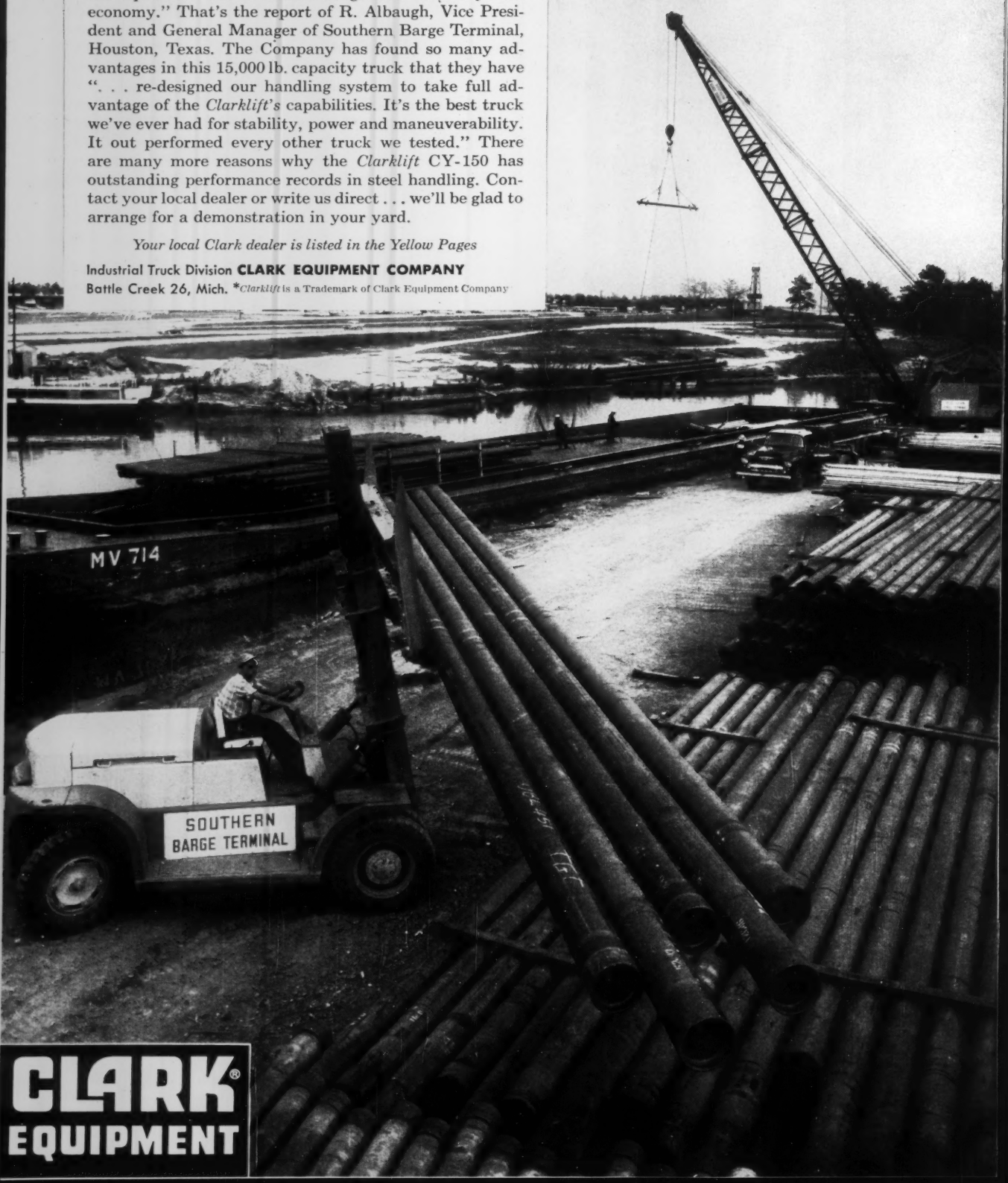
Look for this brand—
your assurance of
non-flaking performance

This Big *Clarklift* pays for itself in first year of operation!

"We move more than 600 tons of pipe a day with our *Clarklift*. The use of our *Clarklift* provides flexibility in our operation which results in greater efficiency and economy." That's the report of R. Albaugh, Vice President and General Manager of Southern Barge Terminal, Houston, Texas. The Company has found so many advantages in this 15,000 lb. capacity truck that they have ". . . re-designed our handling system to take full advantage of the *Clarklift's* capabilities. It's the best truck we've ever had for stability, power and maneuverability. It out performed every other truck we tested." There are many more reasons why the *Clarklift* CY-150 has outstanding performance records in steel handling. Contact your local dealer or write us direct . . . we'll be glad to arrange for a demonstration in your yard.

Your local Clark dealer is listed in the Yellow Pages

Industrial Truck Division **CLARK EQUIPMENT COMPANY**
Battle Creek 26, Mich. **Clarklift* is a Trademark of Clark Equipment Company

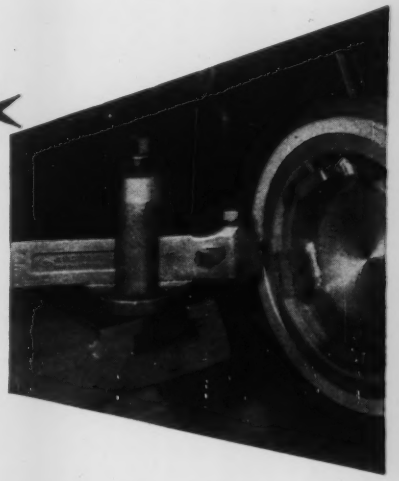


CLARK® EQUIPMENT

PROVED BY INDEPENDENT LABORATORY TESTS:

62% S·M·I*

for FERROCARBO®-TREATED IRON



Progressive foundrymen seeking to improve the machinability and quality of gray iron and malleable iron castings can now rely upon FERROCARBO—the patented additive in briquette form—by CARBORUNDUM. Tests by a widely-known independent research organization, have proved conclusively that the addition of FERROCARBO® to the cupola charge results in finer-grained, denser, and stronger castings with a machinability improvement factor as high as 62% over untreated iron. The better *dispersal action* of FERROCARBO and the resulting *better machinability* of the iron, are your assurance of a *better satisfied* customer.

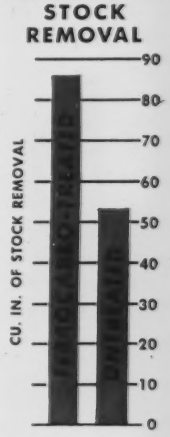
* Surface Machinability Improvement

HOW TESTS WERE CONDUCTED

Tool-wear tests were conducted on metal cast in leading foundries across the country, using untreated iron and Ferrocarbo-treated iron of identical or similar chemistry. Both were machined at commercial speeds using a single point "Carboloy," grade 44A tool. Tool life was determined by measuring wear on the flank of the tool with a 100-power microscope. The charts at the right show actual test data as reported.

➡ **WRITE FOR MORE INFORMATION** on how FERROCARBO produces more machinable iron regardless of metal composition. Ask for booklet—Form A-1409—Electro Minerals Division, The Carborundum Company, Niagara Falls, New York.

Chemical Analyses	Untreated	Ferrocarbo® Treated
C	3.57	3.56
Si	2.25	2.26
S	.10	.10
Mn	.68	.66
P	.11	.11
Cutting speed (ft./min.)	300	300
Feed (in./rev.)	.009	.009
Depth of Cut (in.)	.062	.062
Wear land (in.)	.015	.015
Vol. of metal removed (cu. in.)	53	86
Weight of metal removed (lbs.)	13.7	22.2
Per Cent improvement		62%



VISIT OUR BOOTH
at the 1st Engineered Castings Show (Booth 202)
Cincinnati, May 6-10.

ELECTRO MINERALS DIVISION

The CARBORUNDUM Company

REGISTERED TRADE MARK

FERROCARBO DISTRIBUTORS—KERCHNER, MARSHALL & CO., PITTSBURGH • Cleveland • Buffalo • Philadelphia • Birmingham • Los Angeles • Canada
MILLER & COMPANY, CHICAGO • St. Louis • Cincinnati

84-73 R

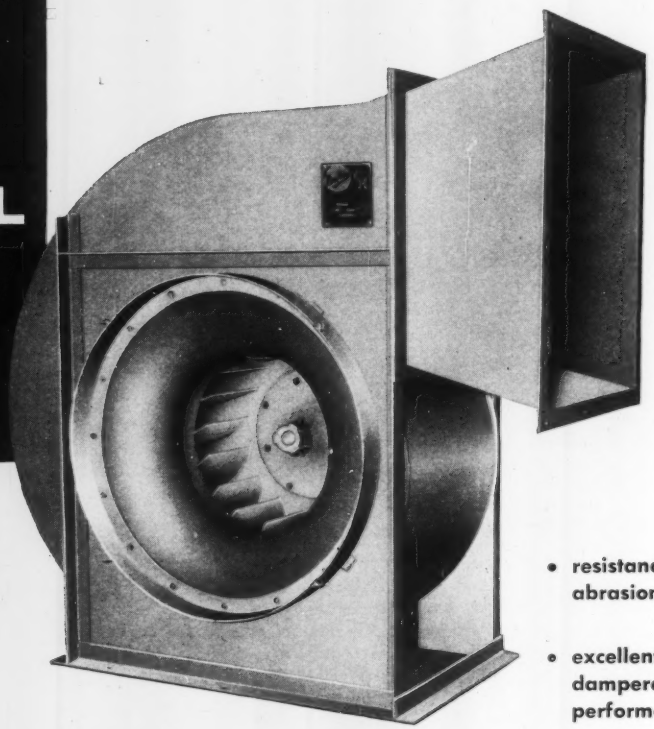
"Buffalo"

TYPE "CR" RADIAL WHEEL FAN FOR SEVERE INDUSTRIAL SERVICE

3 WHEELS TO MATCH YOUR PRESSURE VOLUME NEEDS

The Type "CR" Radial Wheel Fan is one of a series of "Buffalo" Fans to blanket ALL the varying requirements for mechanical draft and heavy industrial service in today's plants.

The "CR" has the high-pressure, wear-resistant characteristics so necessary for handling dust-laden air or draft service on stocker-fired boilers. It also makes possible selection of a smaller fan for many direct-connected applications — saving first cost. All this plus money saving mechanical efficiency.



In addition to the "CR", you may select a "BR" for higher capacity, lower pressure work — or a "DR" for higher pressure, lower capacity requirements — all in this long-lasting radial wheel series. And for inlet box volume control, these fans may be ordered with "Buffalo" Cantilevered Variable Inlet Vanes. These Vanes do not reduce open-position performance because there is no linkage or sources of turbulence on the inlet side. Write for Bulletin FD205 and see the "Q" Factor* that makes these fans a best buy for you!

- **rising pressure characteristic**
- **resistance to abrasion**
- **excellent dampered performance**
- **lower first cost**

**The "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life.*

BUFFALO FORGE COMPANY
BUFFALO, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo"

VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING FORCED DRAFT COOLING HEATING PRESSURE BLOWING

Steaming humidity—death to metals—can't penetrate RUST VETO

Protection against rust, indoors and out, is a world-wide problem . . . and Houghton has been solving such problems for 87 years. Whether the job is protecting military equipment on a steaming South Pacific island or preventing rust loss for a machine shop in New England, Houghton products have become the standards of excellence.

Rust Veto 344, for example, provides long-lasting outdoor protection. A single application is all that's needed, and this general-purpose rust preventive gives you these advantages:

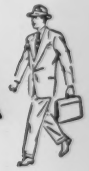
- Fast drying—handle it in 4 hours
- Tough, thin (.003") film is rosin-free
- Won't harden, crack, or peel
- Easily removed with solvent-soaked cloth
- Safely withstands 100° humidity

There's a Rust Veto designed expressly for your corrosion problem. Ask your Houghton Man about the complete line or write direct to E. F. Houghton & Co., 303 West Lehigh Avenue, Philadelphia 33, Penna.

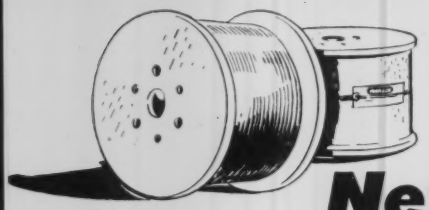
RUST VETO . . . a product of

For your tool room . . .
Handy Aerosol cans of RUST VETO SPRAY. Ask the Houghton Man

E. F. HOUGHTON & CO.
PHILADELPHIA • CHICAGO • DETROIT • SAN FRANCISCO

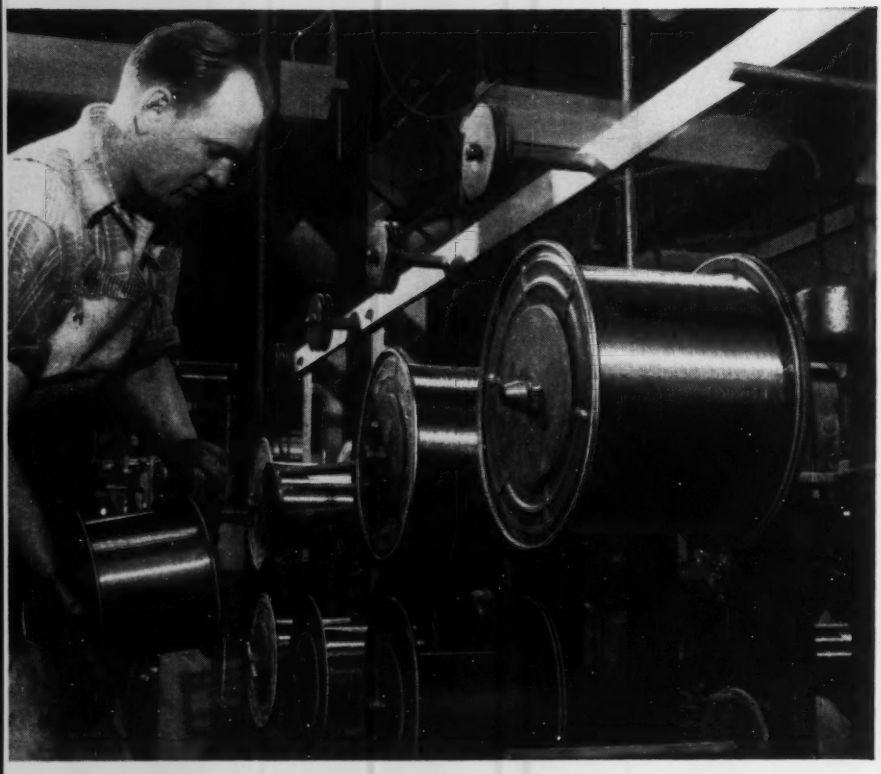


Ready to give you on-the-job service . . .

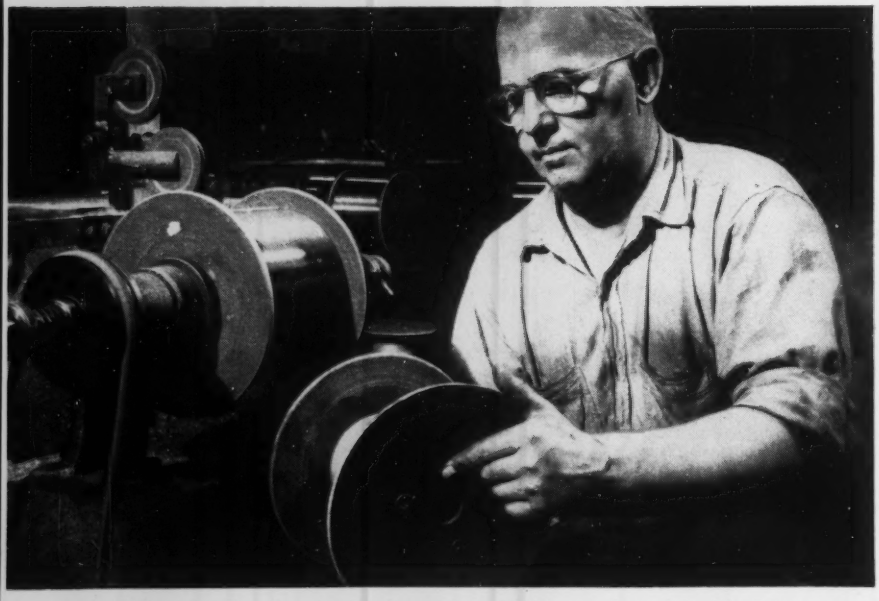


New Discard-a-Spool

Reduces Thermoid's Wire Rewind Loss to ½ of 1%



Light-weight Discard-a-Spool fits easily and quickly on let-off equipment.



Discard-a-Spool cut wire losses in rewinding to less than ½ of 1 per cent.

(Advertisement)

Johnson Steel's New One-Way Spool Weighs 28 Ounces vs. 200 Ounces

In a mountain-lined valley in Utah, a year-long test of an improved method of packaging fine wire has been stamped "a complete success."

Thermoid Western Division, Thermoid Company, Trenton, N. J., one of the nation's top manufacturers of wire-reinforced rubber hose, has given full approval to Johnson Steel & Wire Co.'s new Discard-a-Spool.

Light-weight, non-returnable Discard-a-Spool underwent testing in actual production at Thermoid's plant for many months. The result: now Thermoid specifies that all hose wire be delivered on new Discard-a-Spools.

Discard-a-Spool offers you these advantages over competitive packaging methods, whether made of metal or tempered Masonite:

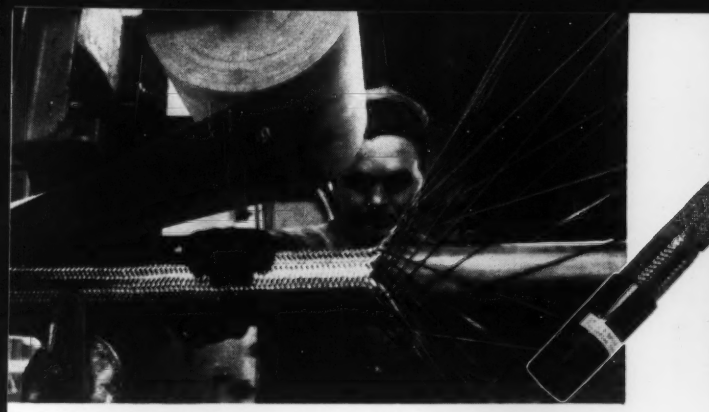
- **It weighs only 28 ounces** and slashes tare weight by 14 times.
- **Fully protects the high quality** hose wire from contaminants and in-shipment damages. Overlaps and tangles are eliminated, the wire's critical surface finish is guarded.
- **Shrinks Thermoid's wire losses** in re-winding to less than ½ of 1 per cent.

Through substitution of Discard-a-Spool for the heavier, must-be-returned steel spool formerly used, Thermoid computes substantial savings.

A typical package of the new wire consists of 36 Discard-a-Spools in a sturdy, two-layer cardboard box. The box is steel-strapped to a wooden pallet for easy handling by fork-lifts. The entire package weighs approximately 2,385 pounds gross, or 2,250 pounds net, producing a tare weight of 135 pounds.

Using outmoded, heavy spools, which weighed about 12½ pounds and had to be returned to the wire mill, tare weight was 1,023 pounds for the same quantity of wire.

- **Major Supplier**—In the past 21 years, Johnson Steel & Wire has become one of Thermoid's major suppliers of hose wire for a wide variety



Johnson's high-quality hose reinforcement wire is fabricated into braids which form plies of strength around rubber tubing. As many as four braids can be plaited into reinforced rubber hose. At right, cut-away section shows plies of wire separating layers of rubber.

Johnson Steel is a major supplier of the high quality hose reinforcing wire Thermoid Western uses at its Nephi, Utah, plant. For 18 months, Thermoid cooperated with Johnson Steel & Wire Co. in extensive production tests of the new Discard-a-Spool.

of high-strength rubber hoses.

At Nephi, Utah, Thermoid's hose wire braiding machines convert Johnson's wire into plaited sheaths around rubber tubing. The number of braids in a hose is determined by the end use of the hose. Thermoid builds dozens of different types of wire braided hose, ranging from 3/16th inch to 4 inches in diameter. They vary from hose with a single ply, or layer, of plaited steel wire to 4 plies of practically unbreakable wire plaiting.

In a standard 50-foot length of four-ply, 2½ inch hose, 38.5 miles of Johnson wire is used, fitting it for tough hydraulic pressure jobs like core, water and oil well drilling and sand busting in the oil fields.

Without steel reinforcing, rubber hose has a bursting resistance of only about 50 p.s.i. In the case of half-inch reinforced hose, the first ply of braid raises bursting strength from 50 p.s.i. to 10,000 p.s.i. A second layer increases it to 16,000 p.s.i. These are minimum figures, since Thermoid actually builds its hoses so that breaking points are four times maximum working pressures on the hose.

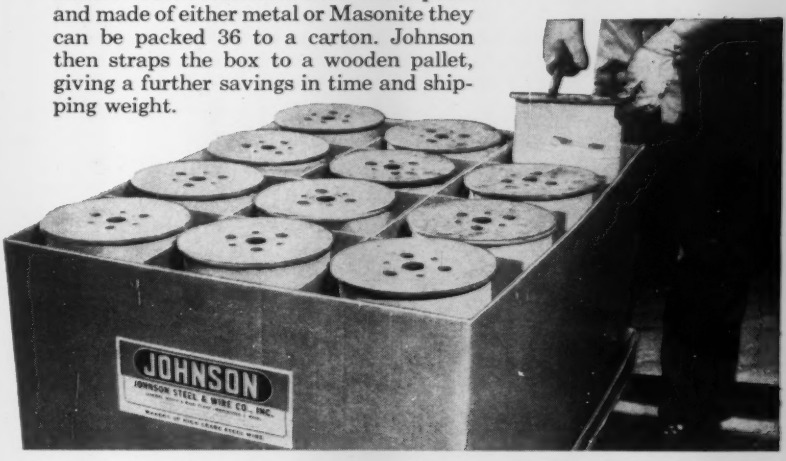
According to J. A. Muller, Thermoid's Director of Research and Development, the secret of building good hose rests on a number of factors. Among them is steel wire of high quality.

Thermoid selects Johnson wire because its structure meets or exceeds specifications. The wire surface is free of nicks which could cause premature fatigue stress or breakage during braiding operations.

• **Cleanliness Vital**—Good adhesion also requires a wire with a clean surface. To get superior adhesion Thermoid uses a dry assembly process for hose components.

These advantages of Johnson's wire are not the only benefits Thermoid gains. Johnson's products stay within the specified tensile ranges.

Discard-a-Spools are lighter and easier to handle than returnable hose wire spools and made of either metal or Masonite they can be packed 36 to a carton. Johnson then straps the box to a wooden pallet, giving a further savings in time and shipping weight.



Variations in tensile can cause serious trouble in the braiding operations.

"Any deficiency in the wire shows up in winding or during the braiding operation itself," Mr. Muller explains.

It takes up to eight hours to set up the 120 bobbins on the big braider. One bad wire is enough to jam the machine and the cost to get it set up again is figured at $245—$35 for labor and $210 for damaged and lost wire. The time lost adds still more expense.

The Utah plant, far from the nation's wire producing mills, requires tops in quality and service.

Thermoid's experience with Johnson Steel & Wire Co. demonstrates why you should let Johnson handle your fine wire supply problems.

Johnson's full range of specialty wires and its progressiveness are your guarantee of satisfaction. Let a Johnson specialist explain how top quality wire or the latest packaging improvement—like the new Discard-a-Spool—can eliminate your worries. The Johnson man is experienced and willing. He's as close as your telephone. Give him a call today.

Johnson Steel & Wire Company, Inc.

Worcester 1, Massachusetts

a subsidiary of **Pittsburgh Steel Company**

Grant Building • Pittsburgh 30, Pa.

District Sales Offices

Atlanta	Columbus	Detroit	New York	Tulsa
Chicago	Dallas	Houston	Philadelphia	Warren, Ohio
Cleveland	Dayton	Los Angeles	Pittsburgh	

(Advertisement)

What Rust-Oleum has saved for others is not half so important as the money it can save for YOU...

TRY RUST-OLEUM®

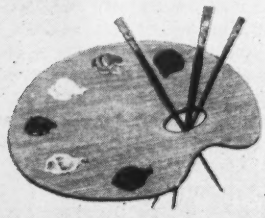
on your rustable metal surfaces under your own conditions

You've got to *try* Rust-Oleum *yourself* to get the feel of it . . . to see how *fast* it covers, how *easy* it works, how smoothly it flows on. You'll see the *big* savings in time, labor and money when you apply Rust-Oleum 769 Damp-Proof Red Primer over rusted metal—eliminating costly surface preparations. You'll see how the *specially-processed* fish oil vehicle *penetrates* rust to bare metal where it stops rust to assure long wear. You'll say you've never used a coating that went on so easily and covered so well. Try Rust-Oleum *soon*—in your plant or around your home. Write for illustrated literature with color charts.

Rust-Oleum Corporation, 2515 Oakton St., Evanston, Ill.

APPLY DIRECTLY OVER SOUND RUSTED METAL

No costly surface preparations usually required—just scrape and wire-brush to remove rust scale and loose rust—then brush Rust-Oleum 769 Damp-Proof Red Primer right over the remaining rust.



MANY ATTRACTIVE COLORS TO BEAUTIFY AS YOU PROTECT

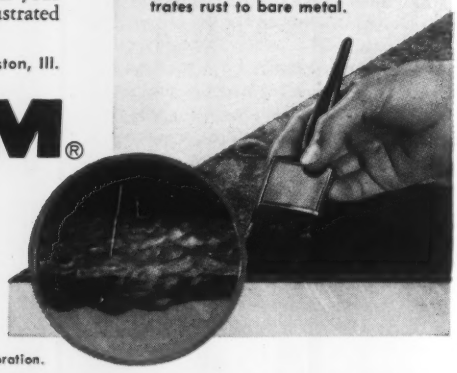
Colors, colors, colors—they're yours in many attractive Rust-Oleum finish coatings—including Aluminum, White, Red, Gray, Green, Blue, Yellow, Black and many more.

DISTINCTIVE AS YOUR OWN FINGERPRINT

Rust-Oleum is *exclusive*—with a specially-processed fish oil vehicle in both primers and finish coatings. Accept no substitute. Prompt delivery from Industrial Distributor stocks.

— — — — — — — — —

Write for special thirty-page report showing how Rust-Oleum penetrates rust to bare metal.



RUST-OLEUM®

STOPS RUST!®

Rust-Oleum and Stops Rust are brand names and registered trademarks of the Rust-Oleum Corporation.

Simplicity Model S-200 Asphalt Plant recently delivered to Ben M. Hogan & Company, Little Rock, Ark. This is Hogan's fourth Simplicity Plant, and is producing well over 100 tons of asphalt mix per hour.

"4 times around the world—that's how far we estimate a Standard Steel ring will travel as an integral part of a Simplicity Asphalt Plant"

"In 40 years of service we estimate that a bull gear and tire on the rotating dryer drum of a Simplicity Asphalt Plant travels at least 100,000 miles to make four million tons of asphalt without defecting. These and other components of our asphalt plants are forged by Standard Steel Works.

"But we are not only justly proud of the durability of our products, thanks in part to Standard, but also of the service we render our many customers—both in terms of delivery and of maintenance. And that's where Standard Steel Works is of greatest value to us. A special delivery arrangement with Standard Steel Works, plus their personalized service, helps us maintain superior service to our customers."

Frankly, we feel we deserve this fine compliment from Mr. Whitfield. We know how important it is for *our* customers to keep *their* customers satisfied. That's why we take a special interest in their needs and keep letting our men in the shop know the importance of the role they play in helping our customers maintain a favorable competitive position.

Why not invite us to discuss your casting, forging and weldless ring needs with you. It won't cost you anything, and we can probably show you ways in which our service can save you money. Write Dept. 2-E.

"About five years ago we furnished a replacement 8 ft. x 15 ft. dryer drum to a customer whose dryer had been in service on a Simplicity Asphalt Plant for 25 years. The steel tires and bull gear of the old dryer showed no signs of wear and were used in the new drum. Those rings were supplied to us by Standard Steel Works. That's why we know the quality of Standard's rings is as good as the service they render us," *says Harlan Whitfield, of The Simplicity System Company, Chattanooga, Tenn.*

Standard Steel Works Division

BALDWIN · LIMA · HAMILTON

BURNHAM, PENNSYLVANIA

Rings • Shafts • Car wheels • Gear blanks • Flanges • Special shapes

BALDWIN BLH LIMA-HAMILTON

How Meropa EP Properties Protect Heavily Loaded Gears

TEXACO MEROPA LUBRICANT contains special extreme pressure properties that give it a lubricating film of greater toughness. It means full protection for heavily loaded gears and bearings.

Polar additives in *Texaco Meropa* keep it clinging to metal surfaces even under shock loads, or severe conditions of heat, pressure or moisture. And it won't thicken or foam. It's non-corrosive to gear and bearing metals—is stable in use, storage or centrifuging. These are some of the reasons why *Texaco Meropa Lubricant* keeps gears running smoother and longer, and helps keep maintenance costs low.

There is a full line of Texaco Lubricants available to help you get top performance from all your equipment. A Texaco Lubrication Engineer will be glad to suggest the best ones for your needs. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

☆ ☆ ☆

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO Meropa Lubricants

FOR STEEL MILL GEAR DRIVES

STEEL
May 13, 1957

Metalworking Outlook

Out on a Limb

Put these predictions for the first quarter of 1958 in your file for future reference: Federal Reserve Board's industrial production index—148 (it's about 145 now); gross national product—$440 billion annual rate (it was at a $427 billion rate in the first quarter this year); nonagricultural price index—127 (it stands at 125 now); corporate net income—$23.3 billion annual rate (it was $22.8 billion in 1956's fourth quarter); cash dividends—$12.5 billion annual rate (they were $11.9 billion in 1956's fourth quarter).

GNP Climbing Steadily

Gross national product (GNP) should climb steadily the next four quarters, reflecting increased prices and increased production. Prices will be inching upward consistently. Production will flatten out, or even decline slightly, the next four months, then climb. GNP hit a record annual rate of $427 billion in January, February and March this year, up about $3 billion over that of the record last quarter in 1956. Personal income, supported by high employment and rising wage rates, continued its record-smashing advance in the first three months.

Construction Still Gains

Value of new construction put in place in April increased 10 per cent to $3.5 billion (seasonally adjusted), report the Commerce and Labor departments. During the first four months of 1957, construction spending ran 2 per cent better than the 1956 rate, and hit $12.5 billion. Private building dropped 1 per cent to $8.8 billion, while public construction jumped 11 per cent to $3.7 billion. Biggest private construction losses were: New housing, down 11 per cent; farm construction, down 4 per cent. Industrial building ran 18 per cent better than it did in 1956.

Steel: 50 Million More Tons by 1975?

The steel industry will have to add 50 million tons of capacity, a 37.4 per cent increase, over the next 18 years, predicts Roger M. Blough, U.S. Steel Corp. chairman. "For U.S. Steel to maintain its relative position in the market, the corporation will have to increase its capacity by about 1 million tons each year during the period," says Mr. Blough. He believes the most difficult and persistent problem facing management is not tem-

Technical Outlook—p. 119 Market Outlook—p. 189

porary drops in steel production but the job of trying to keep pace with the "enormous demand" for steel that lies ahead.

Strike Idleness Hits a Low

Strike idleness in 1957 promises to be the lowest in 15 years. Only 2.15 million man-days were lost because of walkouts in the first quarter. That annual rate (8.6 million man-days lost) will rise as the year wears on, but prospects are good that we will lose only about 15 million man-days this year. Even if we lose 20 million, 1957 will be the best year in 15.

Unfair Labor Charges Drop

Filing of charges of unfair labor practices by employers and employees dropped 14.7 per cent during fiscal 1956. In a study of the National Labor Relations Board's report, Commerce Clearing House discloses that this drop in the NLRB case load represents a reversal of a trend in progress since 1953. Unfair practice charges against employers decreased 19 per cent, to a total of 3522 cases, compared with 4362 filed the previous year. Charges against unions, however, totaling 1743, showed a smaller drop, 3.6 per cent.

The Older Workers

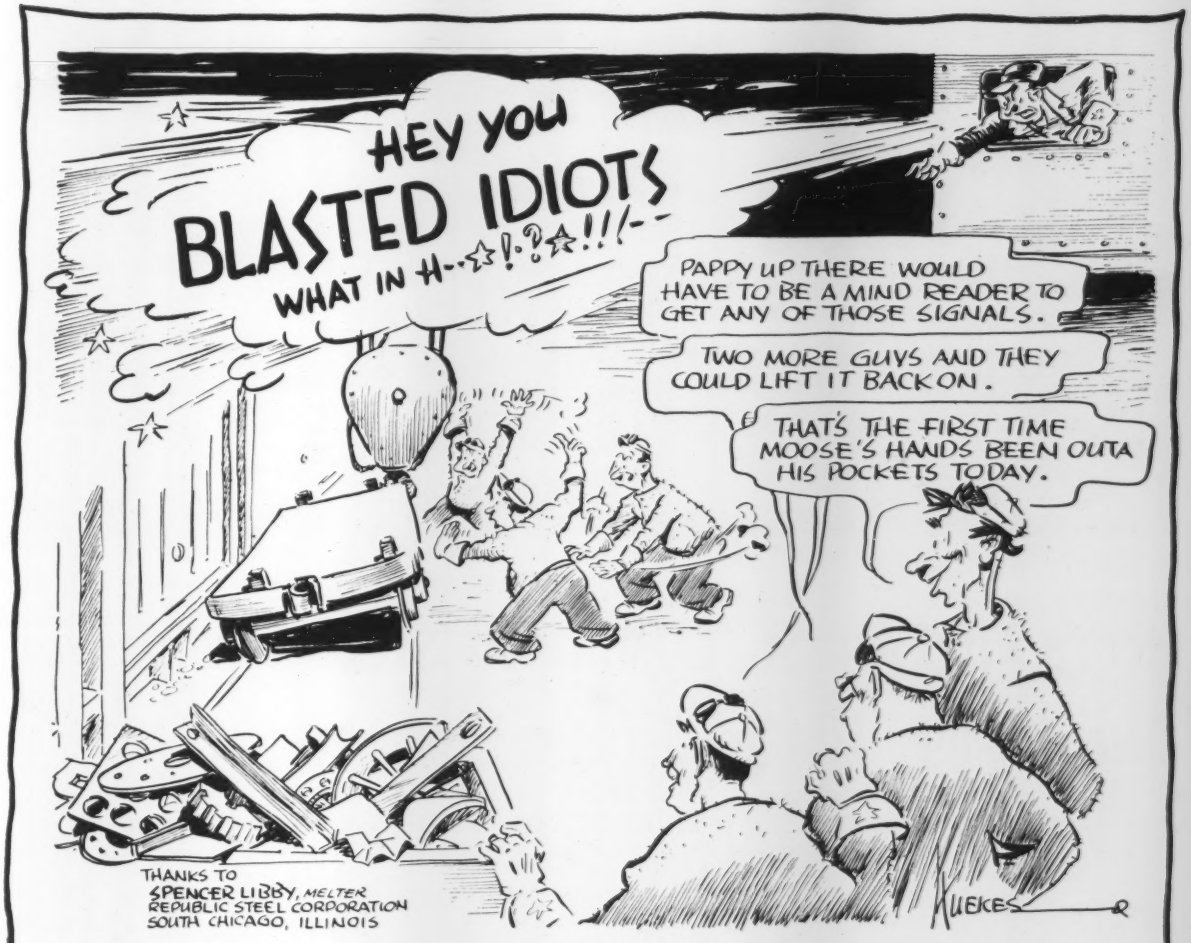
Nearly 3 million people over 65 are working today, but they represent only a small portion of older workers who could be effectively utilized by business, says the Small Business Administration. It makes these claims for older workers: 1. Their absentee rate is lower, not higher, than their juniors'. 2. They have lower injury rates than younger workers. 3. Productivity does not drop appreciably as an employee ages. 4. There is less labor turnover among older people than among younger ones.

Business Takes to the Air

The 65,000 privately owned aircraft being operated in the U.S. will increase to at least 90,000 by 1976, predicts the Aircraft Industries Association. Some 80 per cent of general flying is for business and agricultural purposes. AIA also says: "Business airplanes in 1976 will supply one-fourth of all first-class business transportation at ranges between 100 and 1000 miles."

Chicago PAs Report

The April survey of Chicago purchasing agents discloses these conditions: Tightening of inventories still continues as 36 per cent report lower stocks than in previous months. Employment is dropping, with 16 per cent reporting fewer workers, compared with only 12 per cent so reporting in the previous survey. The most significant decline was recorded in order backlogs. Fifty per cent report decreases, compared with 15 per cent who have increases. Some 32 per cent indicate a fall in profits, compared with 14 per cent reporting gains.


HEY YOU BLASTED IDIOTS WHAT IN H--☆!?☆!!/--
PAPPY UP THERE WOULD HAVE TO BE A MIND READER TO GET ANY OF THOSE SIGNALS.
TWO MORE GUYS AND THEY COULD LIFT IT BACK ON.
THAT'S THE FIRST TIME MOOSE'S HANDS BEEN OUTA HIS POCKETS TODAY.
THANKS TO SPENCER LIBBY, MELTER REPUBLIC STEEL CORPORATION SOUTH CHICAGO, ILLINOIS
KUEKES

The Quarterbacks

WHY NOT DESCRIBE YOUR OPEN-HEARTH CARTOON IDEA AND SEND IT ALONG TO US?

The benefits steelmakers obtain from our refractories are in part a result of Basic's on-the-job servicing. One of the rewards of this close relationship has been the opportunity to observe and appreciate the lighter side of these usually serious craftsmen.

BASIC INCORPORATED 845 HANNA BUILDING • CLEVELAND 15, OHIO

Here's Why Armco ALUMINIZED STEEL Type 2 Gives Longer Life to Outdoor Products

Its aluminum coating outlasts the coating on commercial galvanized sheets 3 to 1 in the atmosphere

Both sides of new Armco ALUMINIZED STEEL® Type 2 are protected by a special hot-dip aluminum coating that seals out atmospheric corrosion. Fifteen-year tests (before commercial production was begun) offer strong evidence of its enduring protection.

They show that the aluminum coating on Armco ALUMINIZED STEEL Type 2 has at least three times the life of a standard zinc coating on commercial galvanized steel sheets in a mild industrial atmosphere.

Costs less

Armco ALUMINIZED STEEL Type 2 costs from 29 to 45 per cent less than aluminum, thickness for thickness, depending on the aluminum alloy used for comparison. And since its greater strength usually permits lighter gages, these savings may be boosted nearly 20 per cent more. This economical steel also costs less than galvanized sheets that are to be given a field coat of paint. ALUMINIZED STEEL does not need paint.

Stronger than aluminum

Comparison of Typical Properties Armco ALUMINIZED STEEL Type 2 and Aluminum

	ALUMINIZED Type 2	ALUMINUM					
		3003-H12 (¼ Hard)	3003-H14 (½ Hard)	5052-H32 (¼ Hard)	5052-H34 (½ Hard)	6061-T4 *	6061-T6 **
Tensile Strength, psi	54,000	15,000	17,000	34,000	37,000	35,000	45,000
Yield Strength, psi	40,000	13,000	14,000	26,000	21,000	21,000	40,000
Elongation % in 2"	22	12	9	12	8	22	12

*Solution heat treated and naturally aged.
**Solution heat treated and artificially aged.
Modulus of elasticity for steel—about 29,000,000 psi; for aluminum alloys—about 10,000,000 psi.

Write for details

If your products are used outdoors, let us show you how Armco ALUMINIZED STEEL Type 2 can give them longer service life—at less cost. Just call the nearest Armco Sales Office, or write us at the address below.

ARMCO STEEL CORPORATION

1427 CURTIS STREET, MIDDLETOWN, OHIO

SHEFFIELD STEEL DIVISION • ARMCO DRAINAGE & METAL PRODUCTS, INC. • THE ARMCO INTERNATIONAL CORPORATION

Formula for Leadership

What does it take to be a leader?

Dr. A. A. Potter, president of Bituminous Coal Research Inc., has been studying the subject for over 50 years. As a young engineer in the Schenectady Works of General Electric Co., he developed the hobby of watching, analyzing and recording the traits of people who held or were being promoted to positions of responsibility. He continued to study people as a teacher of engineering at Kansas State College and as dean of engineering at Purdue University.

Here are his observations:

The leader understands and appreciates people. He shows his interest and respect through kindness and courtesy, candor and fairness, tolerance and understanding, optimism and unlimited patience.

He knows the people in his organization and treats those in minor and major positions with equal consideration. He does not short-circuit or override, is quick to praise and reward merit and is careful not to place subordinates on the defensive or criticize them before others.

He has great capacity for work but does not try to do it all himself. He delegates authority and responsibility to others.

He has unbounded enthusiasm for his organization, its products, his associates, subordinates and superiors, his profession and his country.

He is a good finder, not a faultfinder; an optimist, not a pessimist.

He has engaging manners, is tasteful in dress, careful to express himself clearly and correctly.

He impresses people because of his clarity of thought, action and expression, because of the vibrance of his voice, the sparkle of his eye, because of his vigor and animation.

He has a sense of humor and an understanding heart.

He commands the respect of his organization through his education, professional attainments and culture.

He is open minded, emotionally stable, willing to assume responsibility, puts first things first, adheres strictly to lines of authority, has the ability to meet new situations courageously and resourcefully.

He constantly observes people who are promotable, insists that the right people are in the right places, makes sure that prejudice does not influence promotion.

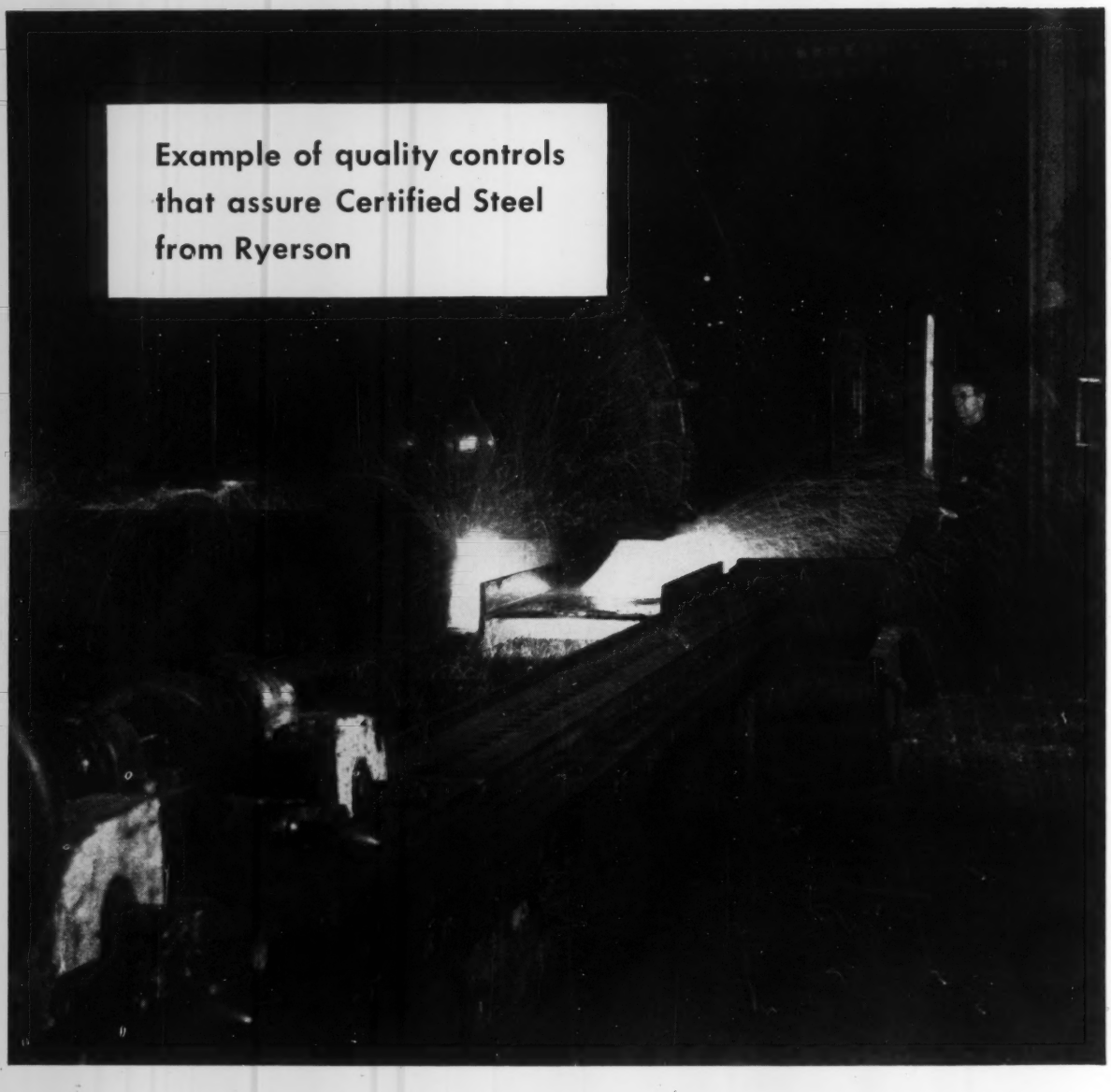
He has social responsibility, is an exemplary family man, is interested in public affairs and good government and orients his work to company and community interests.

We heartily endorse Dr. Potter's views. So should the young man on the way up. So should the man who has arrived.

For any person who wants to get ahead, Dr. Potter's formula for leadership is a code to live by.

Irwin H. Such

EDITOR-IN-CHIEF



Cuts 24" beams in 12 seconds!

When this big friction saw cuts cold steel like hot butter it also completes one more step in the quality control of Ryerson steel.

A new method of blade alignment and an automatic gauge of our own design assure a remarkably straight, true cut—and frequent blade changes result in minimum burr!

This kind of control is typical of the exacting attention we give to every operation. As a result, we achieve far greater accuracy than called for in standard tolerance tables—almost without exception.

Certified cutting of Ryerson steel and the over-all control of Ryerson steel quality are important points to remember when you're specifying or buying steel from stock.

RYERSON STEEL

In stock: Carbon, alloy & stainless steel—bars, structurals, plates, sheets, tubing, industrial plastics, machinery, etc.

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • WALLINGFORD, CONN. • PHILADELPHIA • CHARLOTTE • CINCINNATI CLEVELAND • DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

How State, Local Taxes Vary (Tax rate of a hypothetical $125-million company)

CITY, SCHOOL AND COUNTY PROPERTY TAXES

	Detroit	Chicago	Indianapolis	Cleveland	Buffalo	Pittsburgh
Real property	$253,000	$247,500	$185,000	$157,500	$263,500	$188,000
Personal	564,500	369,000	265,500	235,000	-0-	-0-
	$817,500	$616,500	$450,500	$392,500	$263,500	$188,000
Comparison (Detroit 100%)	100%	75.41%	55.11%	48.01%	32.23%	23.00%

STATE TAXES

Franchise tax	$ 84,500	$ 5,000	$ -0-	$ 26,500	$444,500	$ 85,500
State income tax	-0-	-0-	-0-	-0-	-0-	331,500
Sales tax	10,000	65,000	-0-	10,000	30,000	75,000
Business activities tax	182,000	-0-	-0-	-0-	-0-	-0-
Gross receipts tax	-0-	-0-	42,000	-0-	-0-	-0-
Gasoline tax	14,000	11,500	9,500	11,500	9,500	11,500
Unemployment tax	877,500	634,000	526,500	526,500	585,000	526,500
Intangible tax	1,500	-0-	29,500	37,500	-0-	-0-
TOTALS	$1,169,500	$715,500	$607,500	$612,000	$1,069,000	$1,030,000
Comparison (Michigan 100%)	100%	61.18%	51.95%	52.33%	91.41%	88.07%

COMBINED STATE AND LOCAL TAXES

	$1,987,000	$1,332,000	$1,058,000	$1,004,500	$1,332,500	$1,218,000
Comparison (Mich. 100%)	100%	67.04%	53.25%	50.55%	67.06%	61.30%

Source: Detroit Free Press survey.

Industry Protests State, Local Tax Bites

INDUSTRY is quietly revolting against the heavy tax burdens imposed in some states. One symptom: More and more companies are locating new facilities in states maintaining favorable tax climates.

Michigan, New York and Pennsylvania, for instance, have heavy corporate taxation. All three face a common problem: Home industries are expanding elsewhere.

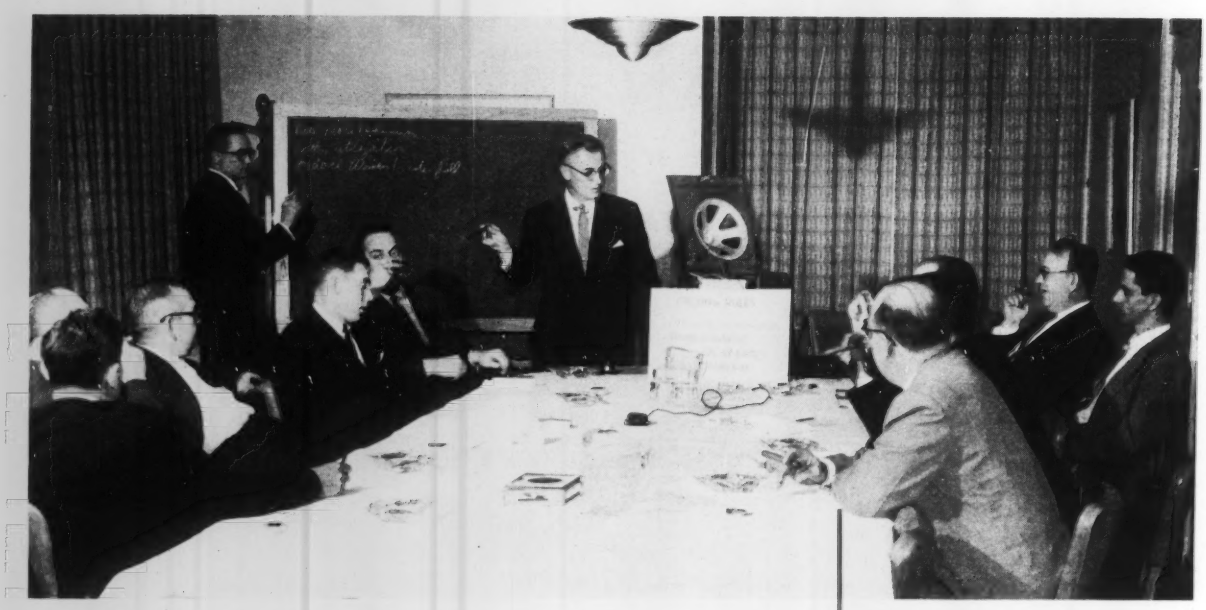
One Example—Michigan industry, the highest taxed of the three (see table above), is kicking its heels at the state's top-heavy business tax structure. Adding to management's woes is a proposal before the state legislature for a 2 per cent corporate profits tax to make up a $50-million deficit in school funds.

In comparison with the favorable tax situation maintained in neighboring states (Ohio and Indiana), Michigan puts two levies on business firms solely for the privilege of operating in the state: 1. A 4-mill franchise tax that brought in $45,100,000 in 1956. 2. A business receipts tax that tapped business in the same year for $59,400,000. Another factor: The unusually high unemployment compensation rates paid by Michigan business. (Average payment was $58.05 per employee last year.)

Retreat?—How does the tax rate affect the location of new business in Michigan? Says General Motors Corp. president, Harlow H. Curtice:

"The present level of business taxation in Michigan has already led us to locate plants in other states where the taxes per GM job are less than one-half of the present taxes per job in Michigan."

Other auto manufacturers don't go so far as to say they're building plants elsewhere because of taxes. But in the last several years Chrysler Corp. has built six plants in Ohio and Indiana where it had none before, and Ford Motor Co. has located ten plants in these states.



PANEL MEMBERS, left to right . . .

CLEMENT C. CADITZ, president
Northern Metal Products Co.
KENNETH PIPER, director of
human relations, Motorola Inc.
WILLIAM CAPLES, vice president
human relations, Inland Steel Co.
WILLIAM YLVISAKER
vice president, Pheoll Mfg. Co.
A. W. VIRTANEN, manager, heating and
air conditioning, Rheem Mfg. Co.
WILLIAM E. DEAN, associate editor
Chicago, STEEL.
WALT CAMPBELL, editor, STEEL.
T. W. BANNON, chief engineer
Clearing Machine Corp.
B. G. MILLEVILLE, chief engineer
Edward Valves Inc.
ROGER CUSHMAN, assistant to chairman
Signode Steel Strapping Co.
CHARLES GRAY, manager of
communications, Bell & Howell Co.
ARTHUR STUDT, manager of education and
training, Hotpoint Co.

BRAINSTORMING IN ACTION

Stretching Engineer Talent

Ten metalworking executives believe that the shortage is more serious in the quality than in the quantity of our engineering manpower

WHAT can we do about the engineering shortage?

STEEL presented that question to ten Chicago-area metalworking executives, adapting brainstorming as a reportorial technique (see the photo).

The session: 1. Turned up some 110 ideas, yielding the six recommendations shown on page 71. 2. Revealed that ten companies represented have, or expect to get, enough engineers, as indicated in the following story.

Definition—Brainstorming is a bull session with a purpose. Panelists are encouraged to let themselves go and give voice to any idea that comes to mind, or to improve upon ideas offered by others. Criticism and evaluation are outlawed during the session. Quantity, rather than quality, is sought.

The 25-minute session (following cocktails and dinner) was recorded. To help stimulate thinking, some of the ideas were written on a blackboard.

Volume—Ideas on how to use the engineers you have to greater advantage ranked first in number. Several participants thought that engineers hunger for prestige; they suggested separate offices, reserved parking spaces, even keys to an executive washroom.

Surprisingly little was said about salaries except that "you can always get enough engineers if you offer enough money." Nor did the panelists show alarm about engineers drifting to sales or other nonengineering jobs because of more attractive offers. One observed: "Those people are usually not creative from an engineering standpoint, anyhow. The creative man will stay in his field in 99 cases out of 100."

Worry—But the executives were alarmed about the tendency for management to give engineers outside assignments. "In preparing for this session," admitted one participant, "I checked the educational backgrounds of many of our people and found six engineers in our production planning section. That situation's going to be checked, and those men may be switched back to engineering."

To recruit more effectively, several participants recommend hiring

college students during summer vacations to get a better idea of their capabilities. Said one: "It's tough to get a clear idea of a man on the basis of the interview alone, especially when he tells you: 'I stand in the top 90 per cent of my class.' "

Heated—Generating the most emotion was talk about the avoidance of overspecification, common in U.S. military jobs. In England, it was pointed out, 200 engineers designed a missile that performed as well as a U.S. bird which required some 10,000 engineers because of its much more detailed specs. "That's gross waste," cried one man.

Consensus: The engineering shortage is a problem of quality, rather than quantity. And the scarcity of competent men is one troubling all professions today, not just engineering.

Enough Engineers?

Nine of ten prominent Chicago-area firms have no shortage of engineers. The tenth has a shortage because it's expanding.

Here's what the ten brainstormers have to say about the matter as it concerns their companies:

Mr. Caditz (Northern Metal Products): "No Problem."

Mr. Piper (Motorola): "We do have a shortage because we are expanding. We will need 350 more engineers this year. We have set a goal of 450 to take care of the new needs, plus the customary replacement quotas. We confidently expect to be able to hire the 450."

Mr. Caples (Inland Steel): "We will hire 168 new engineers this year."

Mr. Ylvisaker (Pheoll): "We have enough, but we could use more good men."

Mr. Virtanen (Rheem): "We're covered, but we need higher caliber personnel."

Mr. Bannon (Clearing Machine): "We're in balance."

Mr. Milleville (Edward Valves): "We could use a few more, but we're not seriously short."

Mr. Cushman (Signode): "We have 50 engineers and need two more we're sure we'll be able to get."

Mr. Gray (Bell & Howell): "Little difficulty."

Mr. Studt (Hotpoint): "The problem is not so much one of shortage as of misplaced personnel."

All agreed: If the shortage of engineers was as serious as publicized, salary rates would be out of this world. But pay schedules are generally comparable to those of other professions.

How To Have Enough Engineers

. . . the best recommendations presented by ten Chicago metalworking executives

1. **Use your engineers to better advantage. Reserve them for engineering work, not production, expediting or sales. Train them to work more effectively, especially in delegating chores. Match assignments with interests.**

2. **Use technicians to take over more routine duties, such as testing, drafting and clerking. Women are particularly good in repetitive tasks.**

3. **Do the engineering job just once. When work is subcontracted, let one department do the whole task for prime and subcontractors.**

4. **Use college engineering professors, either as consultants or full time during their vacations. Undergraduates studying engineering may also be useful on a co-operative basis.**

5. **Write engineering specifications to give the designer as much freedom as possible. Military specs are particularly tight, requiring too much engineering time.**

6. **Look within your own company for people with creative engineering talent. Aptitude tests or alert observation may turn up hidden talent. The company usually pays for any extra training necessary.**

• *An extra copy of this article is available until supply is exhausted. Write Editorial Service,* STEEL, *Penton Bldg., Cleveland 13, O.*

Warehouse Business Is O. K.

Order volume ranks 1957 among trade's three best years, distributors report at ASWA's 48th annual meeting. Financial, marketing and manpower problems discussed

STEEL warehouse business is good. While orders aren't coming in as readily as they did a year ago, tonnage and profit prospects for 1957 are encouraging.

That was the consensus of distributors attending the 48th annual convention of the American Steel Warehouse Association in New Orleans, May 8-10.

Optimistic—Most warehousemen contacted by STEEL are confident that order volume will rank 1957 among the industry's best three years. Some said is could be their best.

In the first quarter, receipts were at an annual record rate of around 17 million net tons. Even if the total falls as much as 10 per cent under that figure, volume should top 15 million tons this year.

Stability—Except for 1955 and 1956, the warehouse take from mills has never exceeded 15 million tons in any year. Last year it hit a record 16,752,233, accounting for 20.12 per cent of mill shipments. In 1955, it was 15,758,005. Operators think volume this year will at least equal 1955's.

Considering sluggish demand from such areas as the automotive and appliance industries, the predicted growth trend of the steel warehouse business is on schedule. According to C. L. Hardy, president, Joseph T. Ryerson & Son Inc., Chicago, if growth continues at its recent rate, possibly 25 per cent of all steel distributed will be handled by warehouses by the late 1960s. The figure was 10 per cent in the 1930s, 15 per cent in the 1940s and 20 per cent last year.

Making Money—After-tax profits on sales probably will be close to last year's respectable 5 per cent. A 3.5 per cent margin was normal in previous years.

These factors account for much of the improvement: 1. Continued heavy demand. 2. More realistic pricing. 3. Close control of costs. (Expenses last year were at the 1955 level—15 to 16 per cent of sales.)

Volume business is more aggressively sought than ever before; larger and more diversified stocks are carried; the scope of services is broader; and metallurgical and engineering consulting services are offered by more warehouses.

CHARLES L. HARDY
ASWA president

Goals—Paul O. Grammer, president of Grammer, Dempsey & Hudson Inc., Newark, N. J., and retiring president of the association, reviewed the industry's past and present problems, pointing up the tremendous advances that have been scored in distribution and the need for continued efforts.

The association's executive vice president, Robert G. Welch, spoke of men, money and markets in the operation and expansion of a dynamic steel distributing industry.

Russell L. Peters, financial vice president, Inland Steel Co., Chicago, analyzed the difficulties facing basic steel in financing costly plant expansion. Since the end of World War II, steelmaking capacity has been increased 42 million net tons. To keep pace with population growth, expansion into the indefinite future is required. Current programs call for the addition of 15 million ingot tons of capacity over the next three years.

Inflation — Inflation has kited equipment and construction costs. From 1946 through 1956, the industry spent $8 billion for equipment and construction. This year, expenditures are projected at a record $1.7 billion, six times the amount spent annually for capital improvements a decade ago. The problem of finding funds is an increasingly serious one.

Pollard Turman, president, J. M. Tull Metal & Supply Co. Inc., Atlanta, discussed financial problems confronting industry.

Thomas J. McGann, Marquette University, and consultant to ASWA on accounting techniques, led a discussion on realistic costing, "Decisions Are Only As Good As Your Facts." The ASWA has been actively promoting "functional costing" among warehousemen.

The perennial debate about the size of a warehouse order and a mill order was taken up by Charles N. Kimball, president, Midwest Research Institute, Kansas City, Mo. He maintained "order research" by warehouses and mills will answer the question. But basically, he said, determination as to where an order is placed rests with the customer and is dependent on which service (mill or warehouse) is the most economical for his needs.

Steel and Warehouses — L. B. Worthington, president, Columbia-Geneva Steel Division, U.S. Steel Corp., gave his views of the warehouse industry from the standpoint of a basic steel industry executive only a few months removed from the give-and-take of the warehouse business. Prior to appointment to his present post, Mr. Worthington was president of the U.S. Steel Supply Division, the warehousing arm of the U.S. Steel Corp.

He stressed the importance of co-operation between mills and warehouses in working out industry problems, many of which are common to both. He emphasized that employees and customers should be made aware of the urgency for better productivity.

Panel—The closing business session featured a panel ("Three Looks at Three Years") made up of Irwin H. Such, editor-in-chief, STEEL; P. J. Sandmaier, manager, Commercial Research Division, Republic Steel Corp., Cleveland; and Herman B. Director, Herman B. Director Associates, Washington. The moderator was William I. Trader, executive vice president, Peninsular Steel Co., Detroit.

Mr. Such traced the course of steel expansion. In the six years since Korea, he said, the industry has spent $1 billion annually, boosting steel ingot capacity 33.5 million tons to 133.5 million as of Jan. 1, 1957. Mr. Such predicted that by Jan. 1, 1961, another 18.5 million ingot tons will be added.

Warehouse participation in the distribution of finished steel should increase to around 22.2 million tons by 1960, he said. (That's 32 per cent above the 1957 figure and 140 per cent above the 1946 pace.)

Taking up market research, Mr. Sandmaier told how market forecasts are developed by Republic. Short term forecasts, he said, help to guide sales efforts, inventory policies and production, product mix and budget planning. Long term forecasts provide the basis for planning new facilities, for preparing long term financing and for developing long term market practices and policies.

Mr. Director discussed warehouse steel shipments. The study of stainless steel shipments last year, he said, was the first step toward establishing the destination of shipments from warehouses. After analyzing the market research problem posed, he concluded that with competition increasing, sales success depends upon a company-by-company program, including commercial research, product development and sales promotion.

New President—Mr. Hardy of Ryerson, was elected president and chairman of the executive committee.

George L. Stewart, Jones & Laughlin Warehouse Division, Jones & Laughlin Steel Corp., Indianapolis, was elected treasurer. Mr. Welch was renamed executive vice president and secretary. Vice presidents are: Marvin B. Marsh, Marsh Steel Corp., Kansas City, Mo., and Robert K. Moses, McCormick Steel Co., Houston.

Founders, Designers Meet

Foundrymen at society's congress show engineers new techniques for improved castings. Speaker sees increased use of light metals by auto industry

THE American Foundrymen's Society Casting Congress in Cincinnati was combined with the society's first Engineered Castings Show. Its purpose was to give leading design engineers a first-hand look as the newest techniques for improved castings.

Foundries have adapted instruments used by doctors to inspect castings, valve seats and blind holes as small as 1/16-in. in diameter. Among the new testing tools shown were radiation devices that have sources of 150-curie strength.

HARRY W. DIETERT
AFS president

All Metals — Displays represented all metals (including titanium and zirconium castings, produced by consumable electrode arc melting) and all branches of the industry.

H. F. Barr, chief engineer, Chevrolet Motor Division, General Motors Corp., the keynote speaker, predicted increased use of lighter metals in the automotive industry and the reign of the piston engine "for a long time to come."

Iron Needed — Mr. Barr emphasized that while the proportion of aluminum and other light metals will increase, more tons of iron castings will be needed because of increased production forecasts.

Chevrolet's experimental work on aluminum cylinder blocks was confirmed by Mr. Barr, but he said economic factors may delay widespread use of this application.

Designs—Mr. Barr said foundry management should be brought into the design effort. Compromises between the designer and the foundryman have to be made he said, "preferably early." He pointed out that the foundry often suggests changes that improve the product's design.

Chevrolet's chief engineer set up these goals for foundries to shoot at: 1. Thinner walls. 2. Reduction of parasitic slugs of metal. 3. Closer dimensional tolerances. 4. Smoother surfaces and less draft.

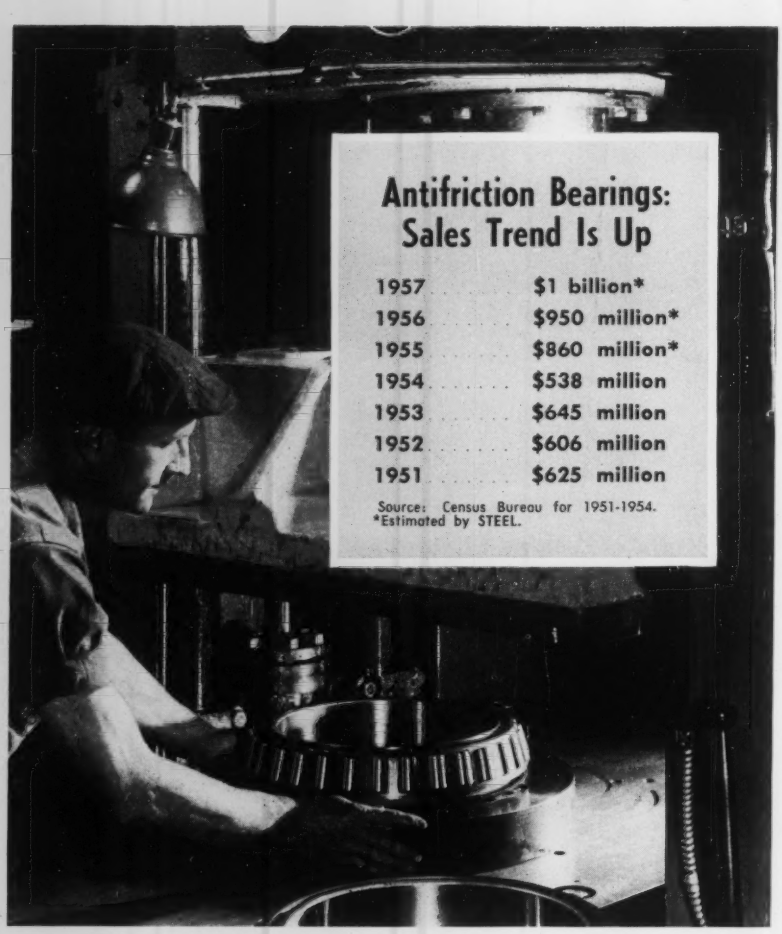
Awards — Gold Medal Awards were made by the society to Johannes Carl Adolf Croning, Croning & Co., Hamburg-Altona, Germany; Charles C. Donoho, American Cast Iron Pipe Co., Birmingham; Clyde A. Sanders, American Colloid Co., Chicago.

Service citations were presented to Thomas E. Barlow, International Minerals & Chemicals Corp., Chicago; Horace A. Deane, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.; and Vincent P. Delport, London, STEEL's European editor.

Awards of scientific merit went to Manley E. Brooks, Dow Chemical Co., Bay City, Mich.; Richard W. Heine, University of Wisconsin, Madison, Wis.; Walter R. Jaeschke, Whiting Corp., Harvey, Ill.; Arthur E. Schuh, U. S. Pipe & Foundry Co., Burlington, N. J.

Adds Foundry in Virginia

Graham-White Mfg. Co., Salem, Va., will erect a foundry next to its present plant. Virgil Frantz, president, estimates it will cost about $200,000.



Timken Roller Bearing Co.

Good Year for Bearings

Antifriction industry spokesmen see 1957 sales volume at least as good as 1956's, possibly better. Railway cars and motors take up some automotive slack

MANUFACTURERS of antifriction bearings think sales this year will equal or slightly better 1956's volume (see table.) The prediction is made even though production of the largest user of bearings—the auto industry—is only slightly ahead of year-ago marks.

Of course, the final tally will hinge pretty much on automobiles, although some makers comment that the slump in automotive requirements is being offset by gains in other areas. One example: Freight car bearings.

Statistics — The Anti-Friction Bearing Manufacturers Association Inc., New York, says the industry has 69 manufacturers. Twenty-nine make ball bearings and 14 make roller bearings exclusively; 26 make both types. Fifteen companies manufacture steel balls.

Many producers make bearings for their own use, special bearings on order only or nonprecision types.

Toss Up—Dollarwise, it's pretty much of a tossup as to which type of bearing—ball or roller—is the bigger seller. The figure may vary 5 per cent, depending on market demand. In number, the nod goes to ball bearings. This is because they are used in autos as well as motors and other high volume consumer products. On a tonnage basis, the top distinction can be claimed by roller bearings because they are much heavier.

Applications of antifriction bearings include: Farm equipment, electrical machinery, machine tools, railroads, road and construction machinery, aircraft, mining and oil equipment, instruments, ordnance, paper mill machinery, steel rolling mills, air conditioning and food handling equipment.

Automation—Among newer users of antifriction bearings are builders of jet engines, rockets, guided missiles, automation, radar and gas turbines. One manufacturer comments that uses are developing because of the automation trend and the higher speeds of transportation equipment.

Another states that new sales are developing because users of plain bearings realize that antifriction bearings offer long term savings. Textile mills, for example, have been converting in great numbers. Growth in sales of sealed and lubricated bearings which require no maintenance is also reported.

Current—Deliveries of antifriction bearings which are standard and stock items are current. Average delivery time on specials and items not carried in stock ranges from 10 to 16 weeks. Because manufacture is dependent upon delivery of special steels, longer lead time is necessary.

Users of antifriction bearings are reducing their inventories to the minimum. These reasons are given: 1. Consumption so far this year is below that of the corresponding period of 1956. 2. Availability of many sizes has improved.

Geared to Steel—Bearing manufacturers feel their prices are certain to increase if inflationary trends continue. It will depend on what happens to their own costs—

steel in particular—and labor rates. Last year's increase, which came after steel prices were raised, averaged 5 to 9 per cent. Bearing prices are not up as much as costs, it is pointed out.

Competition — The industry is highly competitive, and some price cutting is reported.

Imports of antifriction bearings are not regarded as much of a factor. Total imports in 1956 were valued at $4,406,131, which is small compared with domestic production. Exports last year aggregated $39,051,438. A volume close to this is anticipated for 1957.

Overtime Limit Hits Aircraft

Congressional economy talk has been translated into a Defense department order which restricts overtime to 2 per cent of wage payments.

As a result, Los Angeles aircraft makers may trim payrolls $40 million this year. About 28 per cent of the city's 250,000 factory workers are directly concerned.

The virtual elimination of premium pay has forced all major plants to re-schedule production, giving rise to speculation that deliveries of combat aircraft to the Air Force and Navy will be delayed. No orders have been canceled. No layoffs are anticipated.

$37.8 Billion in Write-Offs

Fast tax write-off certificates for 27 new or expanded facilities totaling $197,363,693 were granted by the Office of Defense Mobilization in the two-week period ended Apr. 17. To date, 21,887 certificates amounting to $37,834,398,000 have been approved.

Among the April recipients were:

General Electric Co., Lynn, Mass., $1,230,322 for research and development; Boeing Airplane Co., Seattle, $2,227,301 for military aircraft; Underground Storage & Exploration Inc., $61,375,000 for oil pipe and wartime underground storage facilities in West Virginia, Pennsylvania and New Jersey; General Electric Co., Fitchburg, Mass., $2,120,085 for military turbine generators; Babcock & Wilcox Co., Barberton, O., $2,800,000 for steam boilers.

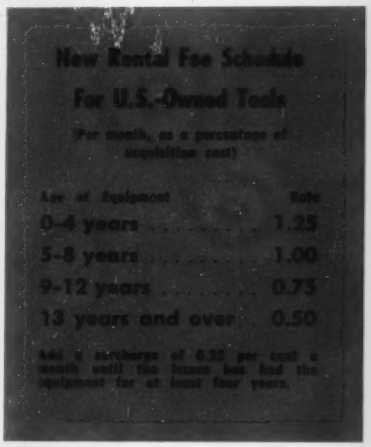
U. S. Tools: New Rent Rates

Defense Mobilizer Gordon Gray reports to association that revised contracts will follow task force recommendation to allow depreciation, even on nondefense production

AS EVIDENCE of his desire to co-operate with industry, Defense Mobilizer Gordon Gray took machine tool builders into his confidence last week. He revealed recommendations for tool leasing practices made by an interagency task force (STEEL, Apr. 22, p. 52).

Mr. Gray will probably put these recommendations into an executive order soon.

Principles—They involve equipment leasing for both defense and nondefense production and establish uniform leasing practices for all agencies of the government. Cooperating in the report were: Office of Defense Mobilization, Small Business Administration, Business & Defense Services Administration, Atomic Energy Commission, General Services Administration and the Defense department.



Uniform provisions will include:

1. Term of the lease.
2. Purchase and renewal option provisions.
3. Restrictions on extent and character of use.
4. Maintenance provisions.
5. Installation charges.
6. Transportation and removal costs.
7. Rental rates.

New Rates—Rates are designed to put the tool lessee on the same basis as the contractor who owns his tools. Under the Korean War contracts, rates have run about 1 per cent of acquisition cost per month. However, a year ago new renewal rates were set up that averaged close to 2 per cent.

Few contracts have come up for renewal until now, and many firms have complained about the boost. So Arthur S. Flemming, the former defense mobilizer, froze all leases until the task force's report was ready.

New Look—Industry should be satisfied with the proposed setup, believe ODM spokesmen. The new rates (see table) take into account depreciation of equipment. Average age of machine tools leased by the government is probably about eight years.

One major change: All government tools will now be rented. Offset contracts, where firms charge less to the government, and in return use the tools free, will be eliminated.

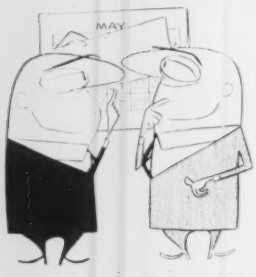
Cost-plus contracts are excluded from the new regulations. It is probable that the elephant tool program also will be an exception.

Revenue—Most of Defense department tools are now out on offset contracts. Of 143,000 defense tools, 126,000 return no rent. ODM guesses that under the new regulations rent revenues will climb from $20 million to $180 million a year.

That $180 million is more than Defense could receive under the maximum rate supposed to be set aside for tool maintenance and buying (2 to 5 per cent of total acquisition value).

Now ODM will push for legislation to make this rent revenue available in a separate fund for equipment modernization, replacement, rebuilding and repair.

Economic Committee Sets June Timetable



THE JOINT Economic Committee will have to push to get fiscal policy recommendations to Congress before the summer recess. Rep. Wilbur D. Mills (Dem., Ark.), chairman of the Fiscal Policy Subcommittee, says he will begin hearings June 3. They will last through the middle of the month at least.

Agenda—The group will consider the present state of our economy and what we may expect in 1958. Undoubtedly, its findings will go far to influence general tax legislation this year and next, as well as specific policies for relieving business's tax burdens. Most important: It will recommend the timing for any tax relief.

Democrats continue to hope for personal tax help as of Jan. 1, 1958, but sources close to the President are guessing he will try to hold it off until July 1. Relief would then coincide with the federal budget for fiscal 1959, rather than conflict with fiscal 1958's budget.

Good Hearing—Business interests will have a full day in court before the subcommittee. Several top corporate economists will appear, plus representatives of business groups. A spot will be made for small business interests, too. Depreciation rates and Bulletin F will be of top importance.

Look for the subcommittee to be rough on the Federal Reserve System's monetary policies. A Democratic majority of three promises that, but the two Republican members will also fire a few rounds. Besides Representative Mills, the Democrats are Sen. Paul H. Douglas (Ill.) and Sen. Joseph C. O'Mahoney (Wyo.). The Republicans are Sen. Barry Goldwater (Ariz.) and Rep. Thomas B. Curtis (Mo.).

New Hope for Right-To-Work Law?

Keep an eye on Sen. John L. McClelland's (Dem., Ark.) move to add a right-to-work amendment to the Civil Rights Bill. Although it doesn't mean such a law stands a chance of passing this Congress, it does show the temper of some legislators. Senator McClelland would not have introduced the amendment unless he was sure of political benefits of some sort. He and other southern Democrats are sure that: 1. They have killed this year's Civil Rights Bill. 2. They have established a safe precedent for civil rights legislation in 1958 (a right-to-work law will again be attached to it). 3. By 1960's presidential elections, when you may expect civil rights to finally pass, the law will be so watered down that even Southerners won't be too disturbed. (Wording probably will be in the vein of 1956's Republican and Democratic party platforms.)

Other View—Liberals are tremendously concerned about this, and some think 1960 may be the year to split the Democratic party away from its more conservative southern element. They reason that the southern attempt to strike a one-to-one relationship between civil rights and right-to-work laws will bring their downfall. They happily point out that Indiana is still the only highly industrialized state with a right-to-work law.

Consider, too, the changing attitude of some top management people: Unwilling to antagonize their unions, and happy with good working relationships between management and labor, some top executives in leading U.S. concerns are coming around to the closed shop point of view. They ask: Why create two elements of labor to deal with (organized and unorganized)?

Interior Department Looks Ahead

Felix E. Wormser, assistant secretary, Interior department, thinks U.S. consumption of iron ore will jump 15 to 25 per cent by 1975, but that U.S. production will do well to hold its own. Most of the new requirements will be met by ore imported from Canada and South America.

The increasing rate of aluminum consumption, says Mr. Wormser, is due to slow down soon, although it should be two to three times what it is now by 1975. He expects domestic production to double. Imports will also show a gain. Higher grade domestic ores of copper, lead and zinc are disappearing, so domestic production may have difficulty in holding its own in the future.

The glamor metals will expand considerably, Mr. Wormser believes. By 1975, for example, he believes the dollar value of titanium produced in the U.S. will pass that of lead and zinc, although it may not pass either metal tonnagewise.

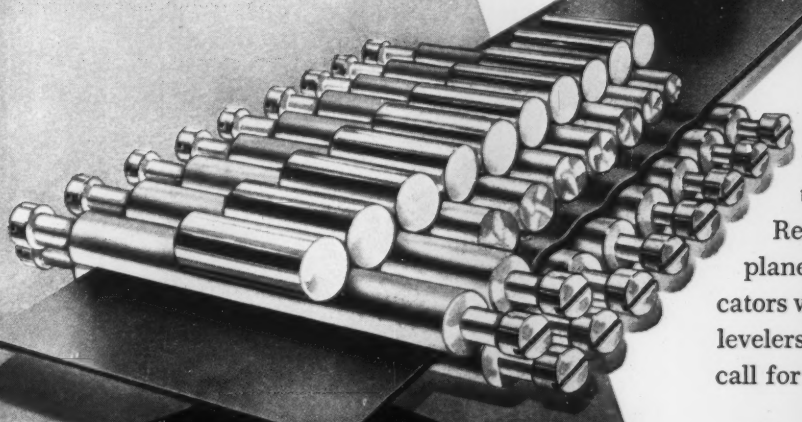
A Target for Euratom

Public power enthusiasts in this country are upset about Europe's fast start toward commercial atomic power. The Euratom group (Benelux, France, West Germany and Italy) may be producing 15 million kw of electrical energy from atomic power stations by 1967 if present plans are realized. That's twice the U.S. figure for that date.

Euratom countries will provide a $1-billion market for U.S. fuelmakers and reactor builders. There will be competition, though. Britain and Canada will vie with us for the market.

McKay ROLLER LEVELERS

. . . From Tin Plate to Ship Plate



Tin cans and super-tankers have more in common than cargo space — the flat steel of which they're made had to be roller leveled. Regardless of the product — cans, cars, planes, appliances or ships — more fabricators will tell you that the "buy-word" in roller levelers is McKay. Write for Bulletin 100, or call for a McKay Application Engineer today.

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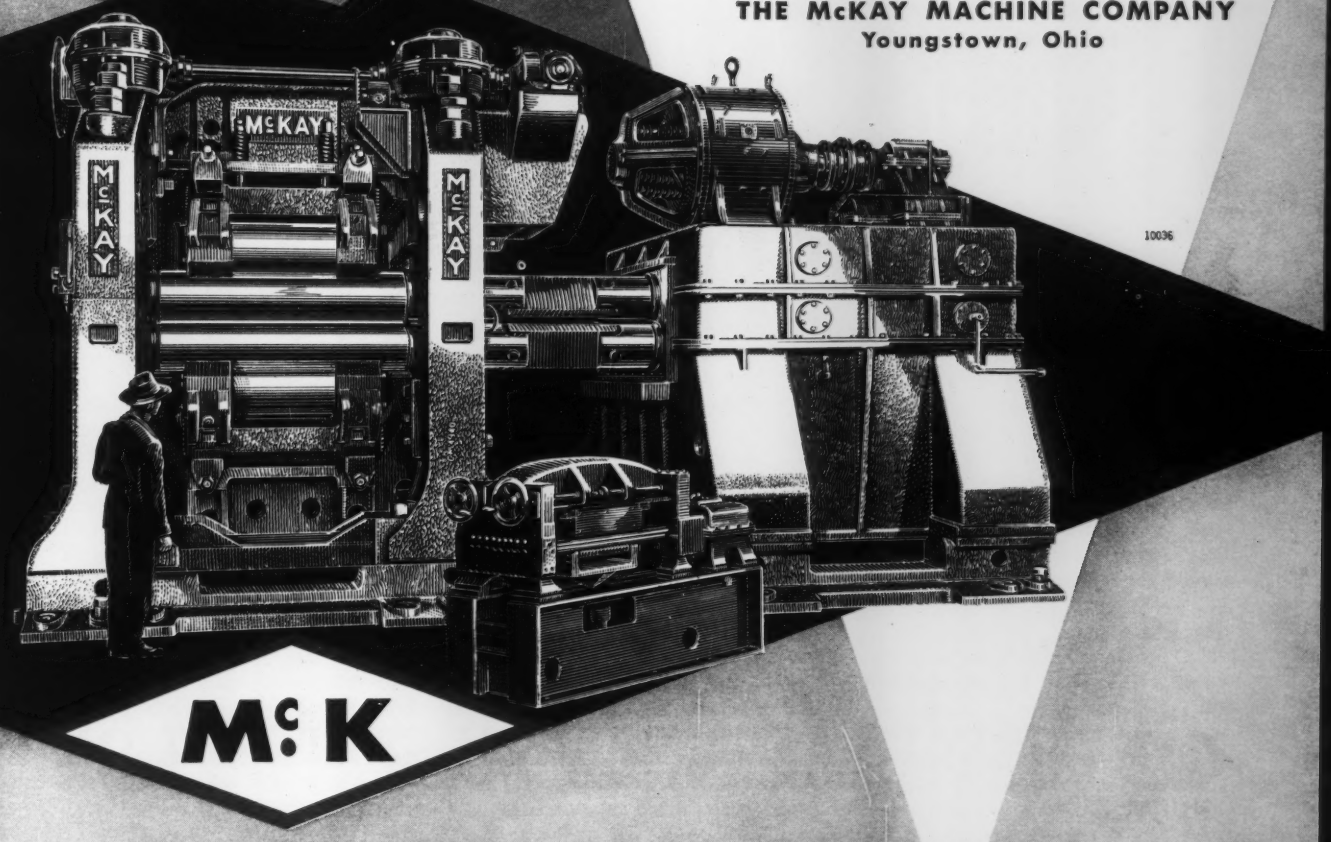

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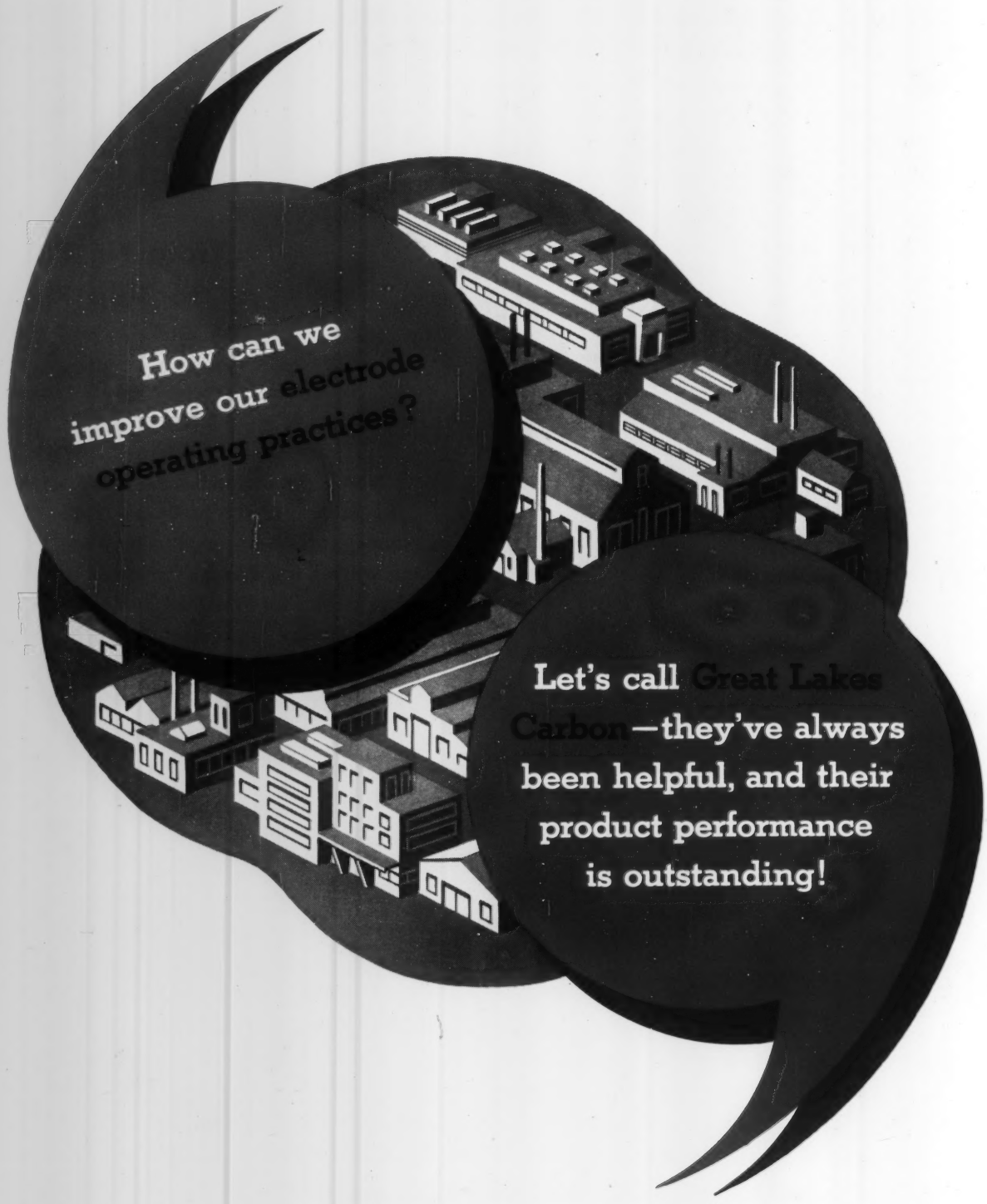
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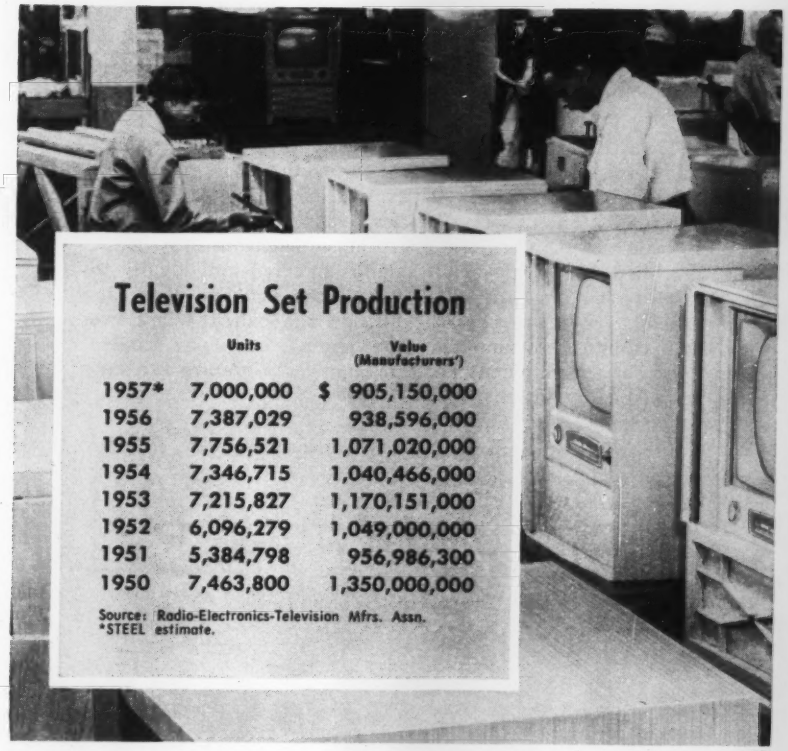


Television Set Production

	Units	Value (Manufacturers')
1957*	7,000,000	$ 905,150,000
1956	7,387,029	938,596,000
1955	7,756,521	1,071,020,000
1954	7,346,715	1,040,466,000
1953	7,215,827	1,170,151,000
1952	6,096,279	1,049,000,000
1951	5,384,798	956,986,300
1950	7,463,800	1,350,000,000

Source: Radio-Electronics-Television Mfrs. Assn.
*STEEL estimate.

RCA

TV Sales: Down, Not Out

Most manufacturers think market for black and white sets is near saturation. Sales of parts are still good, but major hopes ride with color and portable lines

TELEVISION set production will drop for the third straight year in 1957. Assembly lines are tuned to produce 7 million units (see table), but they may fall somewhat short of this figure.

Reason: Black and white sales are off. Since 1947, TV makers have produced 55 million sets with a factory value of $8.9 billion. Many makers believe the market is nearing saturation.

Deciding Vote—This year's outlook actually hinges on how well color receivers and portables do. Color sales might reach 250,000 (about double 1956's), although some producers are doubtful. Factory sales of portables may exceed 2 million. (In 1955, their first year, only 286,000 were shipped.)

If TV set production reaches 7 million units this year, it will have a factory value of $905 million. In units, 1955 was the best year (7,756,521). Factory dollar volume was highest ($1.35 billion) in 1950.

Scramble—For the last five years, competition has been steadily forcing prices down. While production costs have been curbed somewhat by mechanized assembly and shop methods, profit margins have lagged, forcing many firms out of TV set production. Census: 140 producers in 1950 vs. 48 now.

One encouraging factor: The profit squeeze and shakeout which reduced the number of builders has about ended, says William F. E. Long, manager, marketing data, Radio-Electronic-Television Manufacturers Association, Washington. One reason: Production is now pretty much in step with sales.

Dollars—One particularly bright spot on the TV horizon is part sales. Sales of picture and receiving tubes should hit around $585 million this year. Last year, combined sales of the 1200 part-makers came to $560 million.

The uptrend is especially encouraging to manufacturers that have dropped their TV lines. Most continue to make electronic parts. One example: Raytheon Mfg. Co., Newton, Mass., sold its television receiver division to Admiral Corp. but continues to be a supplier of receiving and picture tubes.

Cash and Carry—Manufacturers pin their big hopes for 1957 on sales of portables. Demand for them has increased tenfold since 1955—now accounts for 25 per cent of the market. Philco Corp., Philadelphia, sees steady improvement in this area. Motorola Inc., Chicago, a new entry in the portable field, increased its volume in 1956, contrary to the general TV trend.

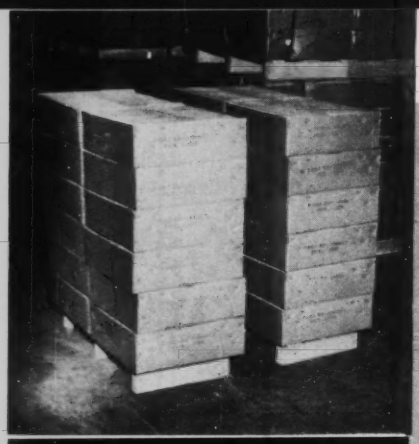
Hues—The outlook for color TV sets is not so optimistic. So far, the viewing public has been lukewarm.

In 1954, one leading producer said: "We'll sink $2 million in color TV before we make a penny." To date, more than that has been spent—the firm's still in the red on color sets.

Says Martin F. Bennett, vice president, merchandising, Radio Corp. of America, New York: "The time is ripe for an all-out effort on behalf of color. All elements are favorable for a bandwagon psychology that could send color television sweeping across the country with the same speed as black and white."

He cites these favorable influences: Color broadcasting programs, improved receivers, more dealers. (Sixty per cent handle them.)

But James M. Skinner Jr., president of Philco, frankly says: "Color television is not expected to be an important factor in our sales this year. Further improvements in receivers and broadcasting are necessary before color TV will be ready for the mass market."



A Packaging Idea and Its Savings

"THREE factors were adding to our transportation, handling and warehouse costs: 1. Production flow of a large variety of parts in small quantities. 2. Limited storage space. 3. Limited dock facilities," says T. E. Shelly, traffic manager of Bendix's Marshall-Eclipse Division, Troy, N. Y.

Switching from small cartons handled individually to tray packs on half-pallets solved the problem (see pictures). Trays are packed while on the pallet. When two half-pallets are complete (top photo), they are banded together for shipment (bottom photo). Here are the savings which resulted:

	Cartons	Tray Packs on Pallets
Number of handlings required	5	1
Cartons per truck load	400	16
Loading time required	4 man-hours	45 minutes
Labels required	400	16
Personnel required	5	3 with output increase of about 60%
Freight rates		decreased
Storage capacity		100% increase
Claims	excessive	eliminated
Sizes required	25	8
Operations eliminated		8

Packaging Can Cut Costs

Bendix Aviation recommends: You should assign the responsibility to the traffic department where all receiving and shipping can be co-ordinated. It's logical, firm says

THE PACKAGING function logically belongs under the administration of the traffic department, believes Bendix Aviation Corp. It has such a setup.

The reasoning: When packaging is effectively co-ordinated with all receiving and shipping activities, it can: 1. Cut transportation costs. 2. Cut material handling costs. 3. Conserve warehouse space.

Saving—Companies can save up to $500,000 annually by organizing their traffic departments in this manner, says A. O. Mooney, traffic manager of the firm's Eclipse-Pioneer Division. He and four other Bendix executives explained the firm's traffic management policy at the American Management Association's packaging conference.

Here are the main reasons for tying packaging to traffic:

One—Packaging is an important element in classifying materials for freight rates. E. K. Gustin, packaging engineer at Bendix's South Bend, Ind., plant cited these examples: Palletizing rough steel stampings (less than 15 lb) instead of shipping them loose saved more in freight costs than the containers cost. Packaging agricultural implement parts under 50 lb earned a third-class rate; not packaged, they had to go first class.

Two—Material not packaged according to freight classification can result in a 20 per cent penalty. Improperly packed items may be refused for shipment.

Three—Package design can be costly in tare weight considerations. In shipping an aircraft component, the original container was a wood box which contained six pieces. Shipments weighing 3600 lb went out under a 5000-lb minimum weight rate. By redesigning the container to a 1/6-in. wire bound veneer which held ten components, freight costs per component were reduced 40 per cent.

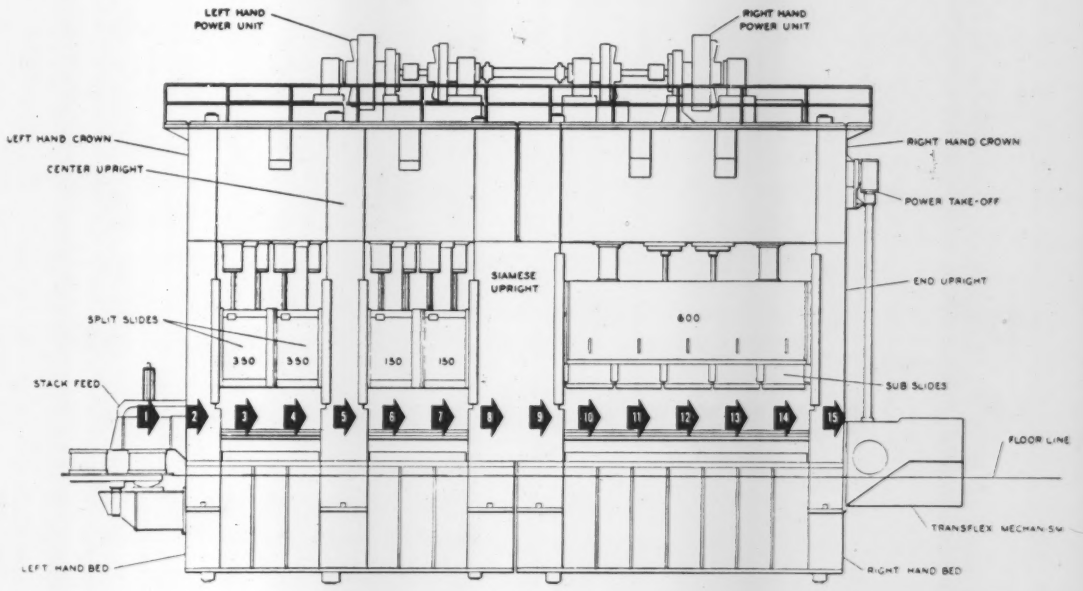
Four—Packaging engineers can work with suppliers to insure the method best suited for particular facilities. In one plant, palletizing incoming parts reduced the time required to unload a truck from 20 man-hours to 20 or 30 minutes. Palletized lumber shipments now

take three men about an hour to unload. Previously, loose lumber took up to 40 hours to unload; demurrage on boxcars dropped from nearly $100 per month to less than $150 over the last four years.

In addition, the receiving department is handling 30 per cent more material with a third less men.

Responsible — In some Bendix divisions, the traffic manager is responsible for all packaging and reports to a corporate official or division general manager. Larger divisions have a packaging engineer who is responsible to the traffic manager.

To co-ordinate all traffic activities, Bendix Aviation Corp. has a traffic committee. Composed of the traffic managers of all divisions, it meets semiannually to solve mutual problems and evaluate the effectiveness of the company's over-all traffic program. Packaging is an integral part of the functions of the committee.



Clearing Builds "Modular" Press Line

ABOUT midsummer, General Electric Co. will be producing tops for its washers and dryers on the automatic press line above. The shift from one top to another will be made with little more trouble than switching from "talk" to "listen" on your dictating machine.

The new press is Clearing Machine Corp.'s "modular transflex" system. "With this new concept in presses," say Clearing officials, "we've solved the two basic problems in automation. Obsolescence has been eliminated, and the line is completely flexible."

Two Units—The press, 58 ft long and 42 ft high, breaks down into two basic units—two crowns and two beds are provided. Frame components can be taken apart and additional components added.

The left-hand section of the press has two 350-ton slides: The center section has two 150-ton slides: The right section a 600-ton slide. Split slides were designed to eliminate extra uprights and reduce over-all dimensions.

Operation—In operation, seven of the nine die stations produce washer tops and six make dryer tops. Here are the 15 stations on the line:

1. Blanks loaded into stack feed. 2. Double blank safety switch and stop. 3. Drawing for dryer. 4. Drawing for washer. 5. Idle. 6. Trim and pierce for washer and dryer. 7. Rewipe and extrude for washer and dryer. 8 and 9. Idle. 10. Cam trim and pierce for washer and dryer. 11. Curl for washer. 12. Cam flange for washer and dryer. 13. Cam notch restrike for washer. 14. Embossing for dryer. 15. Turnover.

Pushbutton — To change production from washer to dryer top requires setting key switch and pushing a button. This automatically positions five motorized slides.

The "transflex" feed system permits scheduling for production change-over as often as required.

"The only Horizontal Boring Mill of modern design today is the

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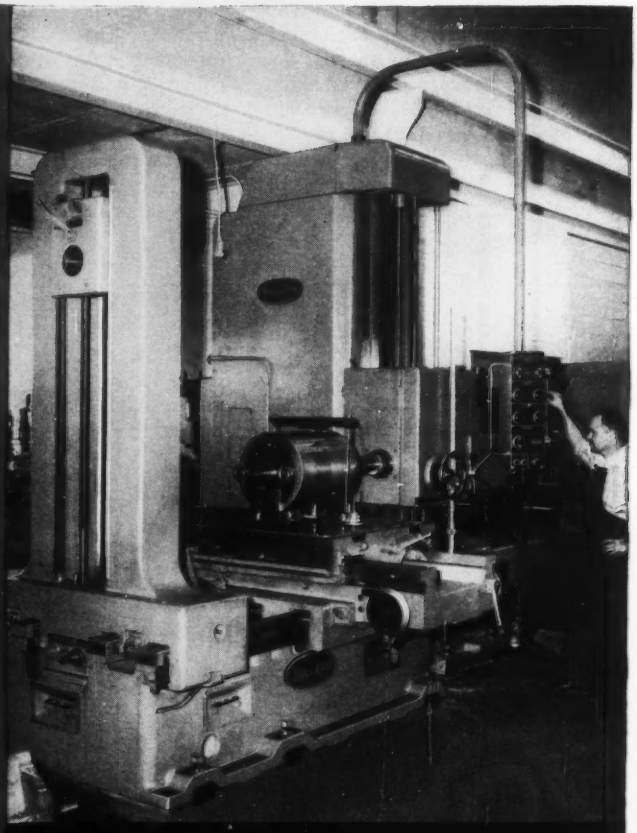
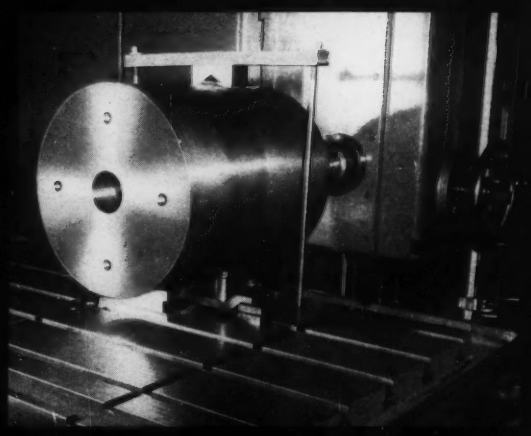


H.B.M., Model 75"

So says Mr. Arthur D. McDonald, President of E & M Enterprises, Inc. of Middleport, New York, builders of special machinery and tools for industry.

"There is no comparison" continues Mr. McDonald, "between our previous boring mill and the Bullard Model 75 — it is more accurate, faster, has more capacity, is simple to operate, has greater rigidity — all of which add up to more weekly production of . . . precision parts". . .



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Cadillac Moves Its Presses

Tight schedule enables GM division to keep up production of spare parts while its entire metalworking section is transferred to former Hudson plant

THE CADILLAC division of General Motors is moving its metal stamping press section into renovated quarters.

Cadillac will gain more turnaround room. It also means the press section should be able to return to five day, two shift operation.

George Elges, assistant plant engineer, is co-ordinating the move.

The division's experience might help other firms facing a similar problem.

No Vacancy—The need arose because the GM luxury car division lacked space to run off replacement parts, keep up with current production and lay out press lines for future models.

It took Cadillac better than 40 years (1902 to 1949) to turn out its first million cars. Thanks to booming sales and production, it will be close to its second million by the end of next year's model run.

Squeeze—Replacement parts for back models no longer can be sandwiched into regular press runs. Longer lead times for model changes mean the company has to find space to mock up life size manufacturing facilities a good two years before they'll be used.

Right now, the division is running current production and making old model replacement parts in one press section. At the same time, plant engineers and master mechanics are laying out dummy presses for 1960 cars.

As one line is phased out after a couple of years, Cadillac turns around and puts the second line into operation. This turnaround system calls for twice as much space.

Purchase—Last October, the division bought the Hudson assembly plant on Detroit's east side—it had been idle since Hudson moved to Kenosha, Wis., in 1954.

The deal gives Cadillac an additional 1 million sq ft of space.

Remodeling—"Our first problem was to modernize the plant," explains Mr. Elges. Power plant, boilers, air compressors and other equipment were 20 to 30 years old. Some of it had been converted and reconverted over the years. There were few employee facilities.

A unit type substation with a capacity of 7200 to 12,000 kva was installed. Three new boilers were put in for the steam generating plant.

A hodgepodge of single press pits was filled in. Gang pits which can handle up to four presses were constructed. Some 11,000 cu yd of concrete were poured.

Scheduling—While all that was going on, Mr. Elges also pondered problems involved in moving 153 presses which weigh anywhere from 5 to 1250 tons. In addition, the stamping department bought 63 new presses which have to be installed.

Crux of the transfer: Cadillac has little room to build up a stockpile of parts. Each press has to turn out enough extra parts to keep assembly lines running until the press can start operating in its new location.

Solution—Mr. Elges first figured out how many days it would take to move each press (from six days to three weeks). Then production engineers took over.

When Mr. Elges got his schedule back from production, each press was numbered and had an operating schedule—enough parts were turned out on it to keep the division going while it was idle.

The next step was to figure out how many man-hours were needed to move each press. Mr. Elges got plant engineering, master mechanics and production to agree on each phase of the operation.

The move was started Apr. 1. All

Huge stamping machines like this produce in rotation

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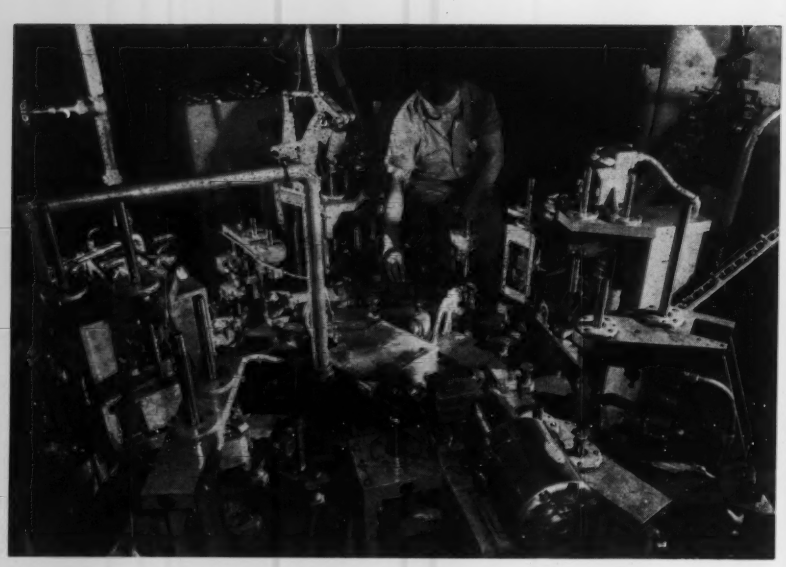


Ford Plant Highlights Automation

This front suspension subassembly machine automatically rejects parts which do not meet quality standards. Some 1200 units an hour are turned out on the multistation setup. It's an example of modern manufacturing methods Ford is using at its Sterling township (Mich.) chassis parts plant

presses will be transferred and running by Sept. 1. At that time, the stamping department will have finished this year's model run and will be set to try out '58 dies.

On Thursday, the presses that will be moved the following Monday are picked, explains Mr. Elges.

Production calls the signals on the moves. Plant engineering makes sure the moving and rigging contractor is ready. Master mechanics recheck layout.

No Goofs—"It sounds simple, but a minor goof anywhere means no more cars come off the final line," says Mr. Elges.

So far only one press has been late getting into operation. "We have to convert all these presses from 220 to 440 volts. On this one we didn't have time for a complete tryout, and we burned up a motor. At that we were only a day late," he reports.

Although Cadillac doesn't reveal project costs, it's estimated that remodeling and moving the presses will run about $10 million.

Supplier Builds Cool Brake

Raybestos Division, Raybestos-Manhattan Inc., Bridgeport, Conn., is making a liquid cooled brake for automobiles.

The brakeshoe is copper lined and has a water jacket which is connected to the radiator cooling system by a piece of tubing.

Tests show that 40 lb of pedal pressure is needed to stop the car after 14 runs and stops at speeds up to 80 mph. Standard brakes used 200 lb of pressure to halt the car after only seven trials.

Raybestos figures the brakes will last for about 100,000 miles, three times longer than conventional ones.

The price has not been marked, but it's estimated to be at least three times that of present systems.

Auto companies are interested. They have been doing their own tests on the brake, but its cost will keep it off anything but luxury models for some time.

U.S. Auto Output

Passenger Only

	1957	1956
January	642,089	612,078
February	571,098	555,596
March	578,826	575,260
April	549,239	547,617
4 Mo. Total	2,341,252	2,290,551
May		471,617
June		430,373
July		448,876
August		402,575
September		190,726
October		389,061
November		581,803
December		597,226
Total		5,802,808

Week Ended	1957	1956
Apr. 6	130,318	129,829
Apr. 13	126,194	136,038
Apr. 20	118,327	129,826
Apr. 27	123,633	127,189
May 4	120,786†	112,705
May 11	120,000*	105,654

Source: *Ward's Automotive Reports.* †Preliminary. *Estimated by STEEL.

Big Three Report Output

Among the Big Three, Ford Motor Co. had the biggest production drop in April. It slipped 16,000 units behind March output. GM was down about 5000 units in April. Chrysler about 7500.

The situation reflects scheduling changes as auto makers go into final phasing out estimates of 1957 production. It does not greatly change current industry percentages.

Ford still holds close to 30 per cent of total car output. Chrysler is right on its 20 per cent mark, but the company lost valuable time because of labor difficulties.

Here's the March-April breakdown:

	April	March
FMC	163,491	179,581
GM	254,969	259,976
Chrysler	114,308	121,902

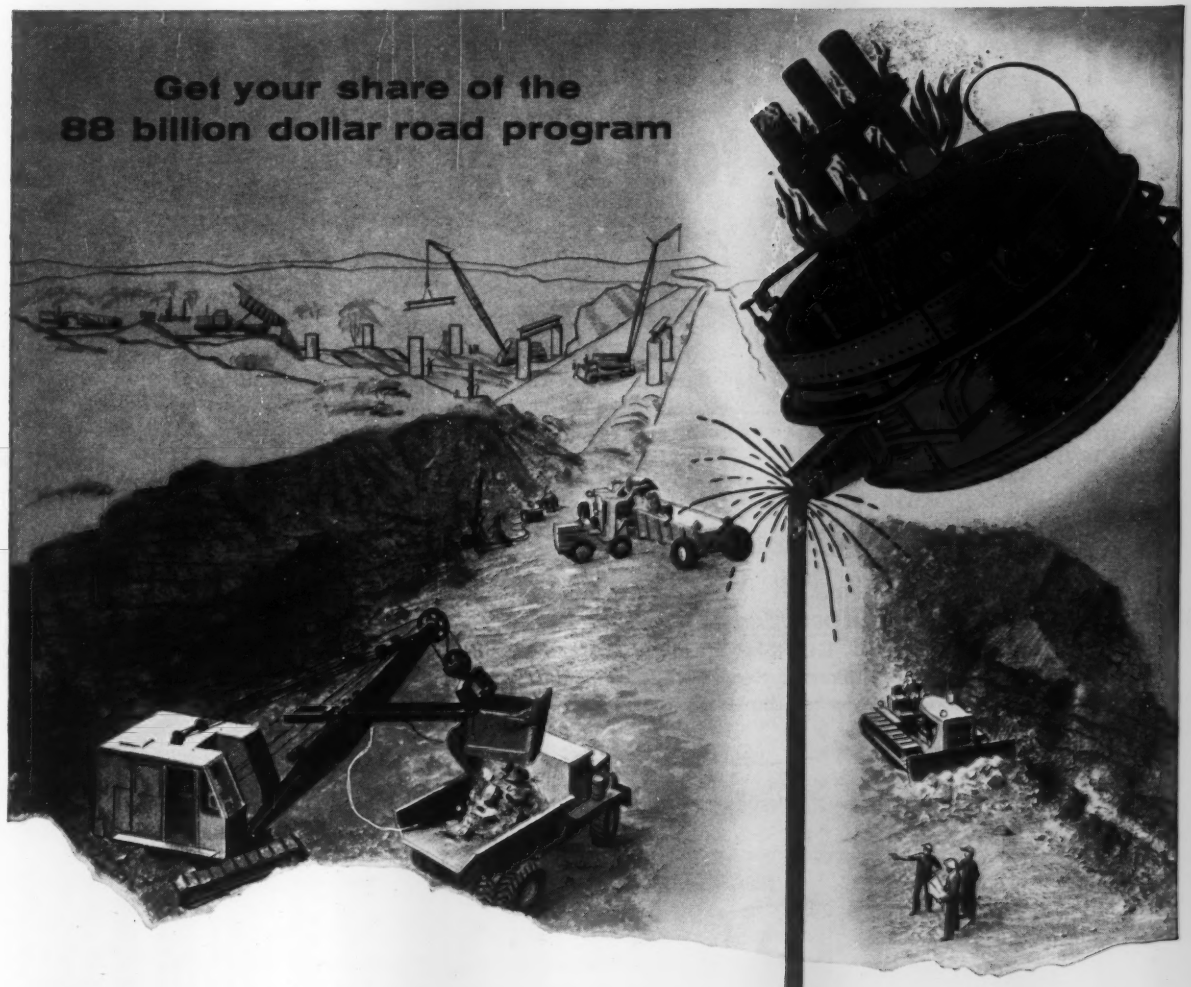
Four-month production totals compared with those of the same 1956 period show more clearly how the three firms are faring this year. GM is 171,805 units behind. Ford is 109,751 units ahead, and Chrysler is up 147,504.

Production figures for U.S. passenger cars only:

	1957	1956
FMC	708,319	598,568
GM	1,086,799	1,258,604
Chrysler	484,352	336,848

Exhaust Note

• Pilot production of Plymouths has started at Chrysler Corp.'s Newark, Del., assembly plant. The facility formerly was used to build tanks.



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MAKERS of quality dies, gages, punches and machine parts rely upon the Graph-Mo® trade-mark to insure the quality and economy needed for their parts. We're proud of that confidence. We prize Graph-Mo's reputation. The trade-mark Graph-Mo helps us protect this reputation. That trade-mark protects *you,* too. Here's why:

The trade-mark Graph-Mo identifies the most stable, machinable and wearable of all tool steels. By specifying Graph-Mo, the original graphitic tool steel, you can always be sure of these advantages and the high quality you've come to expect from Timken fine alloy steels.

To be sure you get Graph-Mo, always specify it by name. And remember it is available only through authorized distributors of the Timken Company. For more information about it or our other specially developed graphitic tool steels, send for the new 10th edition of "Timken Graphitic Steel Data Book". Write The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO". Tapered Roller Bearings, Alloy Steel and Seamless Tubing, Removable Rock Bits.

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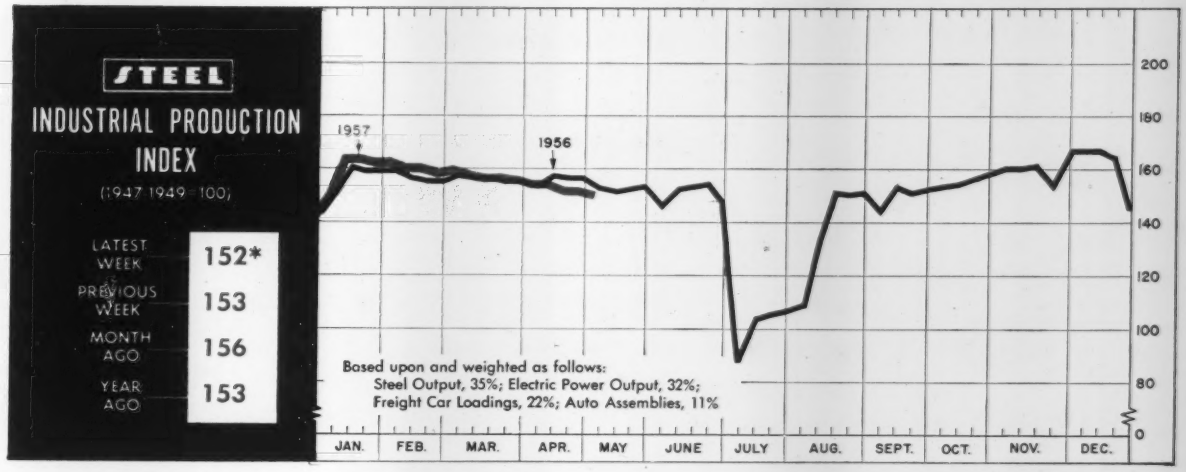


*Week ended May 4.

Decline in Car Loadings Is a Mystery

INDUSTRIAL production holds at a high level, but shipments of finished products are down as much as 6 per cent from year-ago periods. No one seems to have an explanation.

Here are the facts: The Federal Reserve Board's indexes show metal fabricating in the first quarter was 6 or 7 per cent above that of the similar 1956 period. Yet weekly statistics from the Association of American Railroads show that total car loadings through April were 5.3 per cent below those of the corresponding period of last year. Miscellaneous loadings, which include the bulk of metalworking's output, have slipped even farther (they're off 6 per cent).

Clues — Railroaders frankly admit they are puzzled. But they point to seven possible reasons for at least part of the decline.

1. A heavy winter and spring floods have held up a great deal of shipping.
2. The late opening of the Great Lakes shipping season has delayed the normal spring upturn in ore and coal loadings.
3. The reduction in steel operations has reduced shipments from mills to fabricating plants.
4. Auto shipments are slow.
5. Inventories are building up at plants.
6. Company trucking operations are on the increase.
7. Competition from commercial truckers is tough.

If all those factors were going full blast at the same time (and odds are against it), they would account for a good part of the 626,216 carload deficit thus far in 1957, but by no means all of it. "We usually consider rail shipments to be an accurate and up-to-date business barometer," says a railroad spokesman. "But we are baffled by present figures."

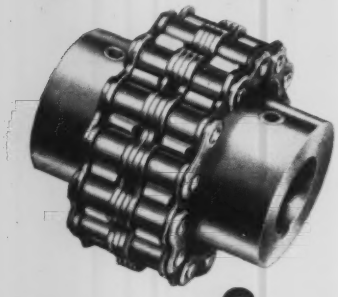
Recouping—Some of these losses

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	2,240[1]	2,226	2,343
Electric Power Distributed (million kw-hr)	11,300[1]	11,310	10,815
Bituminous Coal Output (1000 tons)	9,995[1]	10,200	10,037
Petroleum Production (daily avg—1000 bbl)	8,000[1]	9,537	7,084
Construction Volume (*ENR*—millions)	$476.0	$439.6	$389.0
Auto, Truck Output, U. S., Canada (*Ward's*)	157,205[1]	159,992	148,662
TRADE			
Freight Car Loadings (1000 cars)	685[1]	691	771
Business Failures (Dun & Bradstreet)	263	302	236
Currency in Circulation (millions)[3]	$30,499	$30,610	$30,181
Dept. Store Sales (changes from year ago)[3]	+3%	+13%	−2%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$23,688	$20,933	$23,246
Federal Gross Debt (billions)	$274.0	$274.4	$275.7
Bond Volume, NYSE (millions)	$19.6	$23.4	$21.0
Stocks Sales, NYSE (thousands of shares)	12,043	13,413	13,184
Loans and Investments (billions)[4]	$86.7	$87.3	$85.3
U. S. Govt. Obligations Held (billions)[4]	$26.0	$26.3	$27.5
PRICES			
STEEL's Finished Steel Price Index[5]	228.59	227.41	210.45
STEEL's Nonferrous Metal Price Index[6]	231.5	239.7	277.1
All Commodities[7]	117.1	117.3	113.8
Commodities Other Than Farm & Foods[7]	125.4	125.4	121.4

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1957, 2,559,490; 1956, 2,461,893. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-1939=100. [6]1936-1939=100. [7]Bureau of Labor Statistics Index, 1947-1949=100.

ACME FLEXIBLE COUPLINGS



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Acme Flexible Couplings are used to connect two revolving shafts together and to compensate for angular and parallel misalignment. Acme precision, high capacity, flexible couplings are available in fractional to hundreds of horsepower ratings. They are simple to install and are available in both straight and convex rollers for varied applications.

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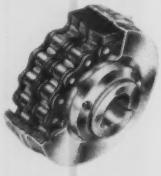

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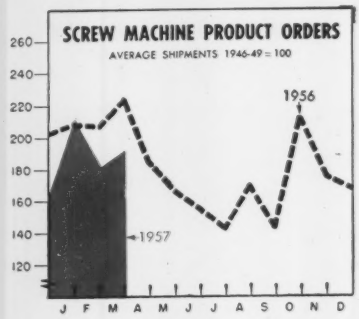
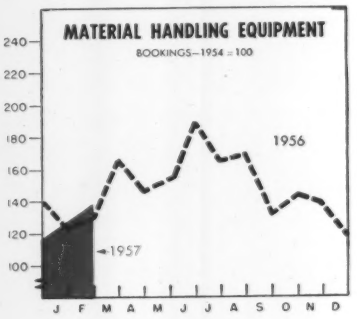
THE BUSINESS TREND



	New Orders 1957	New Orders 1956	Shipments 1957	Shipments 1956
Jan.	211	208	206	216
Feb.	181	207	185	214
Mar.	191	224	202	215
Apr.	...	184	...	199
May	...	165	...	191
June	...	154	...	178
July	...	142	...	137
Aug.	...	170	...	172
Sept.	...	143	...	164
Oct.	...	213	...	202
Nov.	...	175	...	180
Dec.	...	167	...	167
Avg	...	179	...	186

National Screw Machine Products Assn.
Charts copyright, 1957, STEEL.



	1957	1956	1955	1954
Jan.	126.34	122.43	97.00	93.56
Feb.	139.29	129.56	98.71	96.45
Mar.	...	166.14	149.16	115.55
Apr.	...	145.20	109.52	122.76
May	...	155.53	110.50	98.54
June	...	189.13	139.00	112.42
July	...	165.50	111.76	91.68
Aug.	...	168.70	106.20	94.06
Sept.	...	130.35	136.50	88.43
Oct.	...	143.38	123.52	95.41
Nov.	...	138.50	118.09	88.66
Dec.	...	117.76	139.85	102.49
Avg	...	147.68	120.01	100.00

Material Handling Institute Inc.

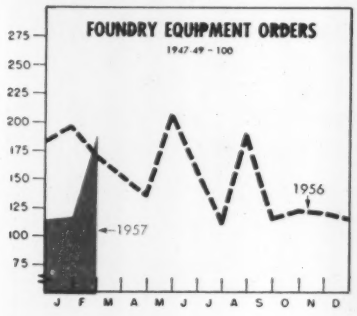
will be made up. Ore boats are moving regularly now. This will stimulate ore shipments and coal loadings as stockpiles at lower lake ports are reduced. And the weather is bound to improve. But it will be almost impossible for the roads to measure up to forecasts made by the regional shippers' advisory boards. They predicted a second quarter gain of 0.4 per cent over 1956's second quarter. The rate now is about 100,000 cars a week short of that goal. One observer notes that the forecasts are usually pretty accurate as long as a trend persists, but they seldom score on an upturn or decline. Shippers overestimated the first quarter by one of the largest margins in the history of the forecasts.

Truckers, too, are wondering. Their shipments slumped noticeably in February, the latest month for which figures are available. Both railroaders and truckers admit that many firms are shipping more goods in their own trucks, but that is a long term trend and would not make much of a month-to-month difference. Shippers feel that a considerable amount of goods is going into inventory, but government figures so far do not uphold the theory. By stages of fabrication, inventories of purchased materials and goods in process have held steady since Jan. 1, and finished goods have increased only 2 per cent.

Heavier Loads—Some of the explanation may be found in the fact that car loads are heavier. The AAR reports that a record of 43.4 tons per average load was set in first quarter, 1956, compared with the previous record of 42 tons. While spokesmen feel that trend has continued into 1957, they say it is not enough of a factor to account for the decrease in number of carloads. As for the balance of this year, officials say that they still feel this will be a good year productionwise, and shipments should show it.

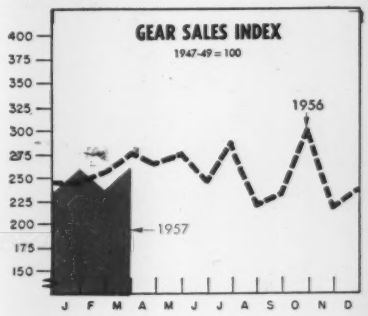
Future Trend in Doubt

The immediate future of STEEL's industrial production index will hinge on the course of car loadings. Despite weakness in everything except output of electrical energy, the index is holding to within 2 or 3 points of year ago levels. No immediate help is expected from the steel industry, which is operating at about 87 per cent of capacity. Auto producers



	1957	1956	1955
Jan.	117.9	195.6	81.0
Feb.	188.4	169.0	90.4
Mar.	....	152.7	163.6
Apr.	....	135.2	178.6
May	....	207.0	145.7
June	....	156.7	186.8
July	....	110.3	213.4
Aug.	....	188.3	134.0
Sept.	....	114.7	156.7
Oct.	....	122.2	108.6
Nov.	....	121.0	154.4
Dec.	....	115.6	183.9
Avg	....	149.0	150.0

Foundry Equipment Mfrs. Assn.



	1957	1956	1955
Jan.	259.3	245.5	140.9
Feb.	239.5	256.2	148.5
Mar.	262.4	276.5	172.8
Apr.	....	264.7	179.8
May	....	275.6	205.2
June	....	245.4	193.5
July	....	286.7	201.7
Aug.	....	219.5	217.6
Sept.	....	230.5	246.5
Oct.	....	299.8	227.6
Nov.	....	216.2	210.4
Dec.	....	235.7	245.5
Avg	....	254.4	198.3

American Gear Mfrs. Assn.

are planning to hold to output of about 125,000 cars a week for the rest of the second quarter. They may cut back if inventories get too large. The summer surge of electricity will not start until the weather gets hot and humid. So, if the index is to head back up, it will be because of an increase in the loading of ore and coal at rail centers.

Structurals Ease a Bit

The March report from the American Institute of Steel Construction Inc. bolsters the belief that structural steel is becoming easier to get. Fabricators shipped 305,009 tons of structural steel, just 0.6 per cent less than they did in the comparable 1956 month. Bookings showed a sizable gain over February's (289,103 tons vs. 265,894) but still fell 23 per cent beneath the year-ago figure.

Trends Fore and Aft

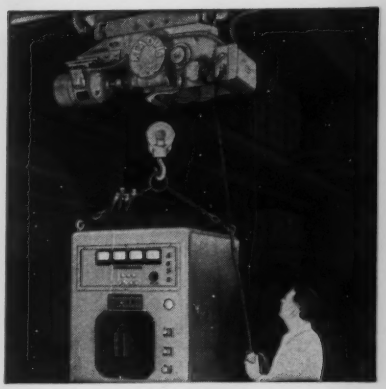
• Manufacturers of screw machine products experienced an uptrend in orders and shipments during the first quarter (see chart, page 88), but business was below that of the corresponding 1956 period.

• Heat treaters reported billings worth $3,571,600 during March, an increase of 7.2 per cent over March, 1956, reports the Metal Treating Institute. Billings to date are 8.7 per cent ahead of those in the year-ago period.

• "Even under a normal economy, we shall for some time witness a new high in all fields of business . . . We may pause now and then, or may even recede a bit, but the long range needs of the world are so great that nothing short of a world catastrophe can stop growth in all fields." So says Henry H. Heimann, executive vice president of the National Association of Credit Men.

• Consumers increased their installment credit by only $40 million in March, compared with March increases of $447 million and $197 million in 1955 and 1956. Total consumer credit stands at $31,273 million.

• Long term prospects for the home laundry equipment business are good, declares Fred Maytag II, president of Maytag Co., Newton, Iowa. But the situation will get worse before it gets better. He sees no improvement until the inventory glut is corrected near the end of the second quarter.



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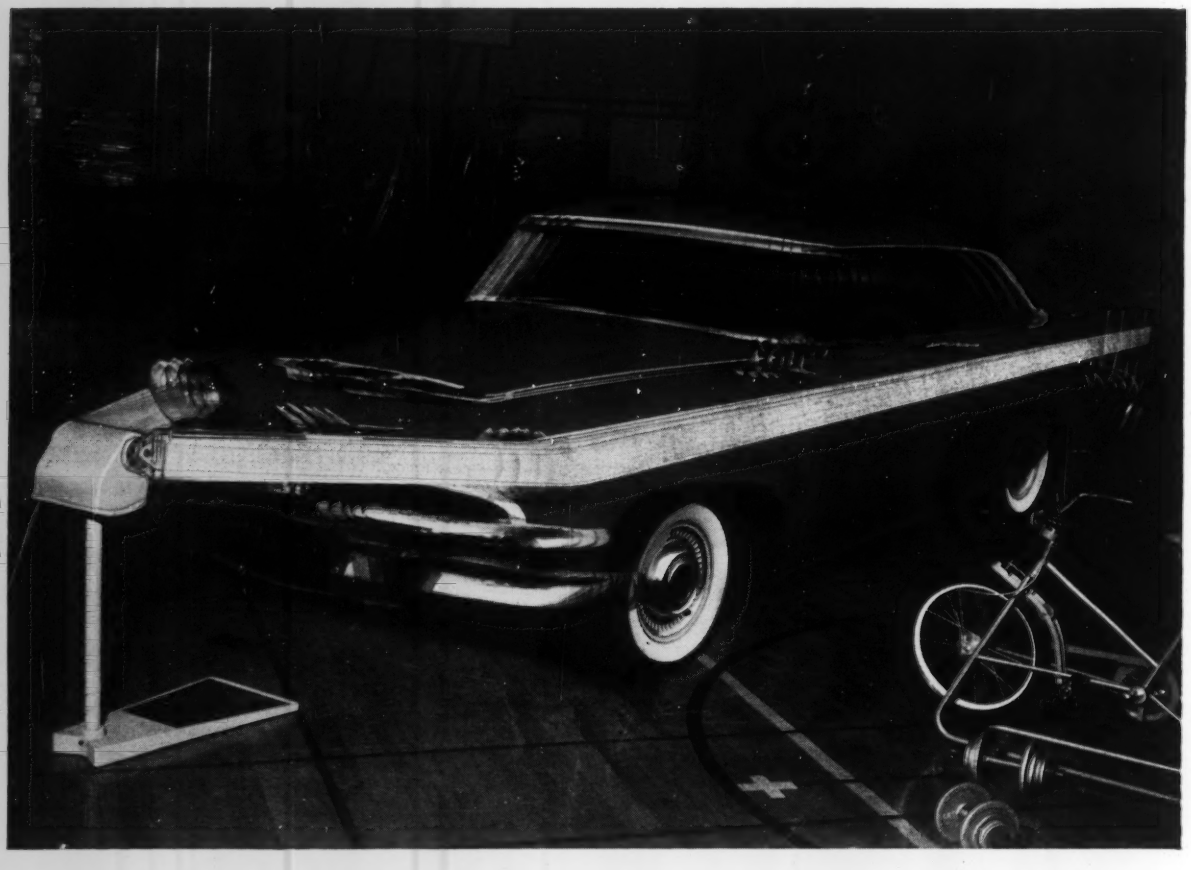

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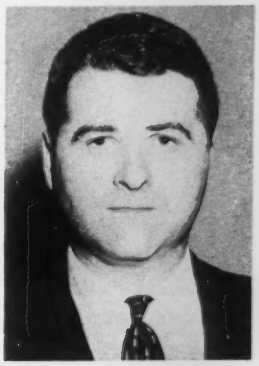
ODD H. McCLEARY
Mathews Conveyer president

DON S. HOLSTEIN
Armco works mgr.



KENNETH H. PIERCE
Precision Castparts sales mgr.

FRANK W. KNECHT JR.
Sharon Steel executive posts

Odd H. McCleary was elected president, **Mathews Conveyer Co.**, Ellwood City, Pa. He succeeds **L. T. Sylvester**, now chairman. Mr. McCleary was vice president and general manager; also senior vice president of the Canadian subsidiary, Mathews Conveyer Co. Ltd.

Don S. Holstein succeeds **G. D. Tranter**, retired, as manager of **Armco Steel Corp.**, Middletown, O., Works. Mr. Holstein was assistant plant manager.

Leo L. Lewis was made production manager of **National Lead Co.'s** titanium division, New York, succeeding **C. Y. Pfoutz**, retired. **Earl H. Schwartzkopf** was made manager of the titanium pigment plant in Sayreville, N. J.

Henry S. Harrison was made plant superintendent for the machine and tools division, **Michigan Tool Co.**, Detroit. He is succeeded as plant superintendent for the Gear-O-Mation division by **Al Combs.**

At American Brake Shoe Co.'s **AmForge Division**, Chicago, **Arthur Nettenstrom** was made executive assistant to the president; **Francis Moore**, sales assistant to the president; **Robert Crocombe**, vice president-sales; **Stanley Dawson**, vice president-operations.

William G. Walk, assistant general superintendent, was promoted to general superintendent of **U.S. Steel Corp.'s** Johnstown, Pa., Works. He succeeds **Thomas P. Riley**, retired.

Kenneth H. Pierce was made sales manager, **Precision Castparts Corp.**, Portland, Oreg. He was production manager.

Lukens Steel Co., Coatesville, Pa., appointed **Lester M. Curtiss** executive assistant-operations to the administrative vice president; **Lloyd P. McAllister**, general manager of production; **Edward J. Charlton**, general manager of engineering and services.

E. Douglas Graham was elected to the new post of vice president-manufacturing services for **Raytheon Mfg. Co.**, Waltham, Mass. He was vice president-manufacturing at Gemmer Mfg. Co.

Hermann K. Intemann was appointed president, **Electro Metallurgical Co.**, division of Union Carbide Corp., New York.

Tom Welsh was made eastern sales manager, a new post at **Snap-Tite Inc.** He has headquarters at Brookside, Del.

H. Y. Smuck was elected vice president-sales; **Tom Zimmerman**, vice president-production at **Quaker State Metals Co.**, Lancaster, Pa.

Temco Aircraft Corp., Dallas, promoted **John A. Maxwell Jr.** from vice president-general manager, Dallas division, to vice president in charge of sales and contract administration for the corporation. **Vernon N. Ferguson**, works manager at Dallas, was elected vice president in charge of manufacturing for all plants.

Frank W. Knecht Jr. was elected vice president, **Sharon Steel Corp.**, and general manager of its Brainard Division, Warren, O. He was vice president of administrative planning with Youngstown Kitchens Division, American Radiator & Standard Sanitary Corp.

National-U.S. Radiator Corp., Johnstown, Pa., appointed **Robert A. Allwein** superintendent and **Franklin Y. Reiter** plant manager of its Duncansville, Pa., plant. **Robert A. Hoy** replaces Mr. Reiter as director of purchases for the company.

George V. Lang was elected vice president-treasurer, **United Engineering & Foundry Co.**, Pittsburgh.

George Lilygren, vice president and general manager, machinery and systems division, **Carrier Corp.**, Syracuse, N. Y., is in charge of the newly formed corporate development division, responsible for Carrier's integration and acquisition program. **Charles V. Fenn**, vice president and assistant general manager, machinery and systems division, becomes general manager.

W. A. Thomas, A. G. Howey, A. C. Rae and **F. J. Lockhart** were elected vice presidents of **Atlas Steels Ltd.**, Welland, Ont.

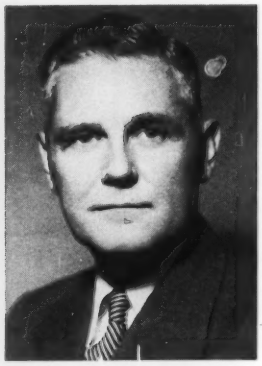
Kawneer Co., Niles, O., elected **Henry W. Zimmer** chairman. Formerly executive vice president, he is succeeded by **Irving R. Seely**, formerly administrative vice president. **David S. Miller** fills

WILLIAM M. HALL

D. LESLIE IRVINE

Wheeling Steel executive sales positions

WILLIAM E. SPRACKLING



RICHARD B. STEINMETZ

Anaconda Wire & Cable Co. executives

the new post of vice president-marketing.

William M. Hall was elected vice president-sales, **Wheeling Steel Corp.**, Wheeling, W. Va. **D. Leslie Irvine**, assistant general sales manager, succeeds Mr. Hall as general sales manager.

Roy E. Nelson was elected vice president, **American Gilsonite Co.**, Salt Lake City, Utah. He continues as production manager.

George R. McKenna was elected executive vice president, **Builders Structural Steel Corp.**, Cleveland. He also was made president of its associated companies, Allied Metals Co., Fabricators Steel & Mfg. Corp. and Fabricators Steel Corp. **Jacob Friedman**, previously president of these companies, becomes chairman.

W. R. Neely was made manager of sales development at **Hansell-Elcock Co.**, Chicago.

Max K. Ruppert was elected president and chief executive officer of **Poor & Co.**, Chicago. **Christian E. Jarchow**, executive vice president of International Harvester Co., was elected chairman of Poor to succeed **V. C. Armstrong**, retired. Mr. Ruppert succeeds **E. C. Bauer**, also retired. **Eugene C. Bauer Jr.** was elected executive vice president.

James H. Jewell, vice president-sales, **Westinghouse Electric Corp.**, Pittsburgh, fills the new post of vice president-marketing. **John H. Chiles Jr.**, manager of the transformer division, Sharon, Pa., and **B. M. Brown**, manager of the Baltimore divisions, were elected vice presidents.

Max E. Bills was made division superintendent, sheet mill at **U.S. Steel Corp.'s** Gary, Ind., sheet and tin mill. He succeeds **Glenn P. Carson**, now assistant general superintendent at the Irvin Works. Dravosburg, Pa.

Don S. Permar was named to the new post of assistant general sales manager, **Le Roi Division**, Westinghouse Air Brake Co., Milwaukee. He was field sales manager.

James H. Kellogg was elected president, **Charles T. Brandt Inc.**, Baltimore. He succeeds **Charles E. Brandt Sr.**, now chairman.

William E. Sprackling was elected president and chief executive officer, **Anaconda Wire & Cable Co.**, New York. Formerly executive vice president, he is succeeded by **Richard B. Steinmetz. H. Donn Keresey**, former president, is now chairman. **David E. Allen** was elected vice president-sales; **Vito F. di Lustro**, vice president-manufacturing.

Samuel S. Auchincloss was elected president and chairman, **Tracerlab Inc.**, Waltham, Mass. **William O. Faxon** resigned as president but continues as a consultant.

Vernon G. Kneeskern was named project manager and plant manager of **Reynolds Metals Co.'s**

R. E. POWELL

MELVIN P. WEIGEL

FRASER W. BRUCE

Aluminium Ltd. management changes

R. E. Powell retires as president of Aluminum Co. of Canada Ltd. but remains active in the company as senior vice president of **Aluminium Ltd.**, Montreal, Que., parent company. **Melvin P. Weigel** succeeds Mr. Powell as director of operations of Aluminium Ltd.

Fraser W. Bruce was elected president of Aluminum Co. of Canada Ltd., principal subsidiary. **S. E. Clotworthy** was elected managing director of Northern Aluminium Co. Ltd., London, England, principal fabricating subsidiary, to succeed Mr. Bruce.

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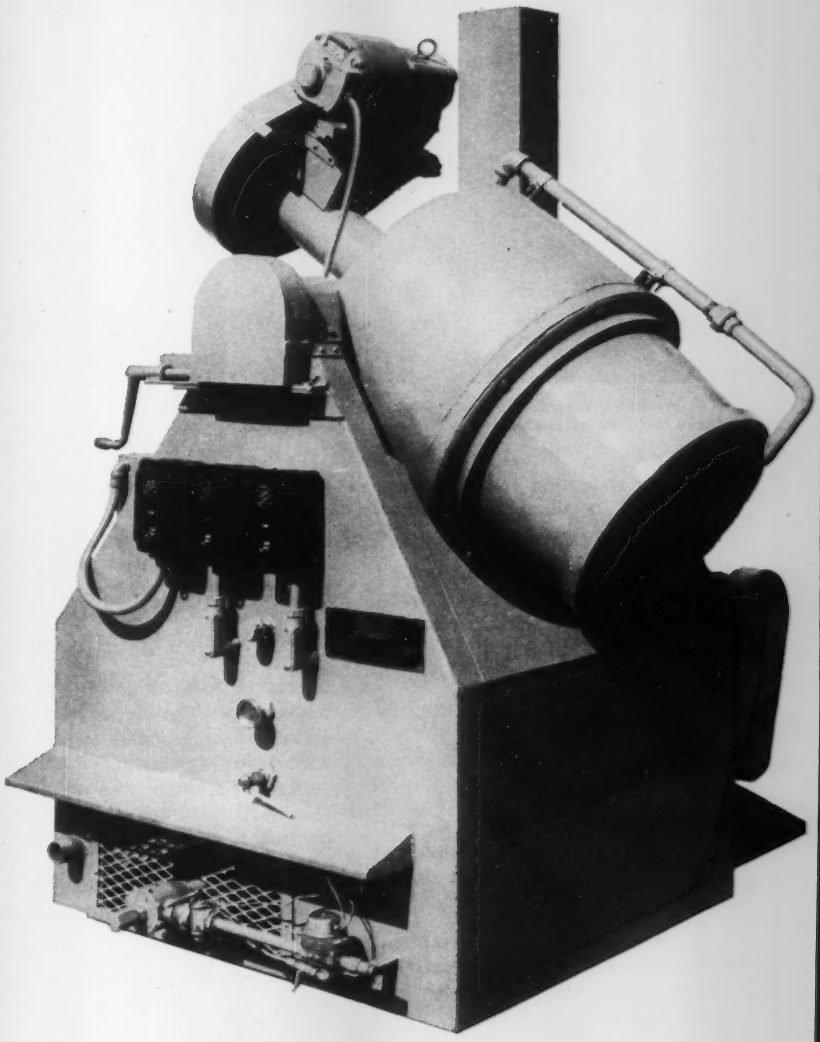
The accumulated knowledge of more than 25 years of designing, engineering, fabricating and installing all types of finishing equipment, is available to you at P-D. Just write, wire or phone . . . we'll be glad to tell you more.



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SAMUEL S. RICKLEY
Morgan Construction post

RICHARD C. CUNNINGHAM
Eastern Stainless sales v. p.

W. BASIL LEACH
Mexico Refractories president

JOHN W. LINDSEY
J&L vice president-purchases

ELLSWORTH A. STOCKBOWER
ACP product sales mgr.

aluminum reduction plant at Massena, N. Y., now under construction.

W. Basil Leach, vice president and sales director, was elected president of **Mexico Refractories Co.,** Mexico, Mo. **John B. Arthur,** founder of the company and former president, was elected chairman and chief executive officer. **C. A. Smith,** vice president-chief engineer, fills the new post of executive vice president and continues as chief engineer. **Carl H. Bachmann,** production manager of the Mexico, Mo., plant, was elected a vice president.

M. E. Swaim was elected vice president-sales, a new post at **National Supply Co.,** Pittsburgh. He was general sales manager.

Edward S. Dik, general manager, **Abbott Ball Co.,** Hartford, Conn., was named vice president.

James W. Lowry was made purchasing agent for the southern district of **Republic Steel Corp.** He is in Birmingham.

John W. Lindsey was named vice president-purchases, **Jones & Laughlin Steel Corp.,** Pittsburgh. **Harvey J. Haughton** was named vice president, controller and a member of the operations committee.

Ellsworth A. Stockbower was made manager of new product sales, metalworking chemicals division, **American Chemical Paint Co.,** Ambler, Pa. He was manager of the ACP technical standards department.

Preston D. Liebig joined **J & S Tool Co. Inc.,** Livingston, N. J., as chief engineer.

Vincent R. Barrord was made manager of development sales for welded tubing, tubular products division, **Babcock & Wilcox Co.,** Alliance, O.

Mark D. Thackaberry was made assistant purchasing agent, Flexonics Corp., Maywood, Ill. He was an assistant to the vice president-manufacturing.

James R. Kerr was appointed president of **Lycoming Division,** Avco Mfg. Corp., Stratford, Conn. He succeeds **S. B. Withington** who assumes new duties in a staff capacity for Avco. Mr. Kerr, an Avco vice president, was head of Avco's Office of Defense Planning.

Samuel S. Rickley was named Pittsburgh representative for **Morgan Construction Co.,** Worcester, Mass., to succeed **Henry H. Wood,** who will serve on special projects in the Pittsburgh area. Mr. Rickley was chief engineer of Superior Steel Corp. before joining Morgan Construction in 1951.

Richard C. Cunningham, director of sales, **Eastern Stainless Steel Corp.,** Baltimore, was named vice president-sales.

William N. McArdle resigned from **Rotary Electric Steel Co.,** Detroit, which merged May 1 with Jones & Laughlin Steel Corp.

OBITUARIES...

Charles C. Cheyney, 68, vice president-sales, **Buffalo Forge Co.,** Buffalo, died Apr. 25.

John J. Hopkins, 63, chairman. **General Dynamics Corp.,** Groton. Conn., died May 3.

Lewis N. Murray, 84, president. **Dunkirk Radiator Corp.** and chairman of **Utica Radiator Corp.,** died Apr. 28 in Dunkirk, N. Y.

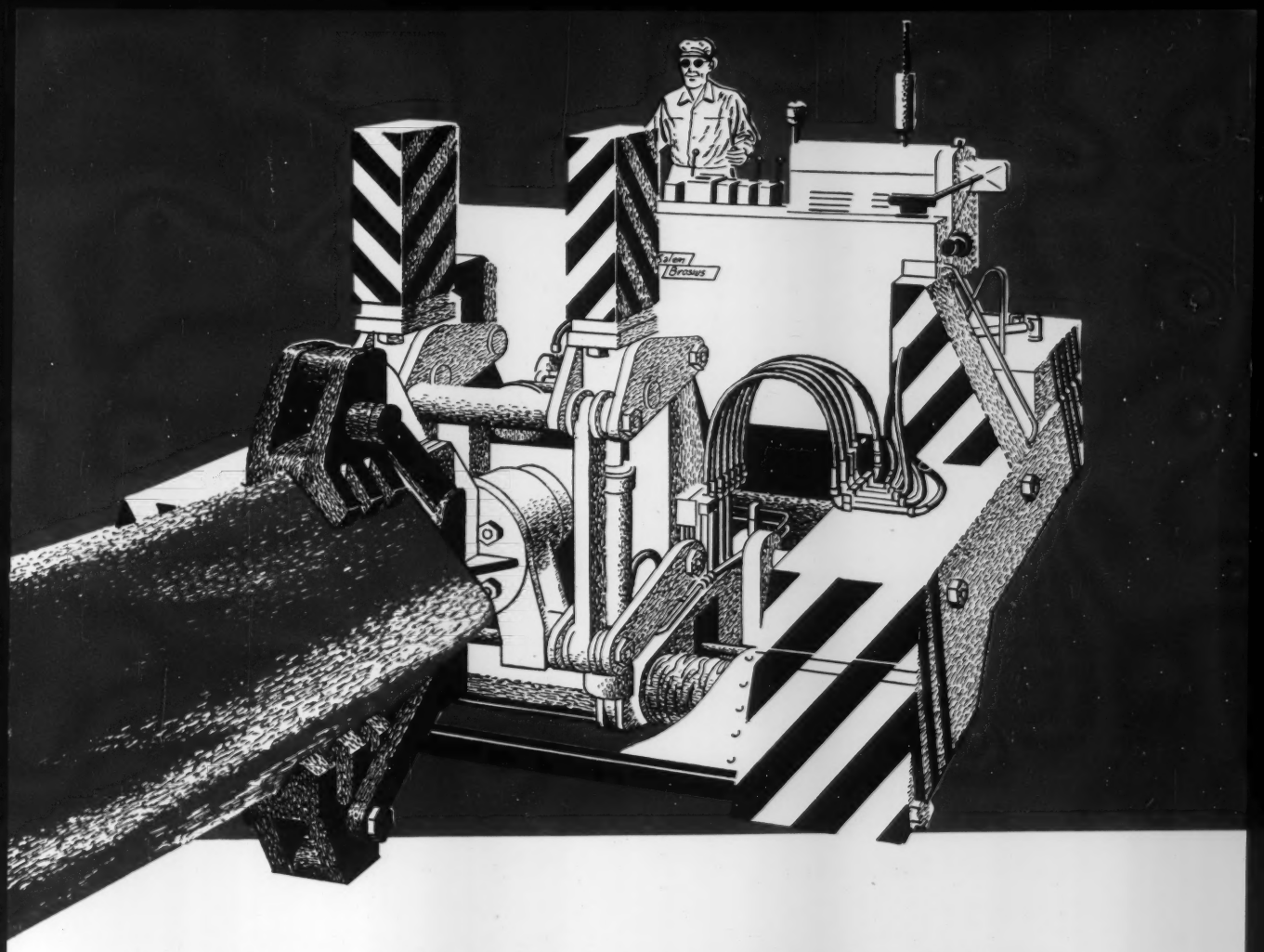
Dexter S. Kimball Jr., 50, vice president, **Bendix-Westinghouse Automatic Air Brake Co.,** Elyria, O., died Apr. 28.

Herbert L. Dawson, 81, president, **Rochester Roll Grinding & Corrugating Co.,** Rochester, N. Y., died Apr. 21.

Roger L. Leighton Jr., vice president and general manager, **Leighton & Bang Inc.,** San Diego, Calif., died Apr. 22.

Frank R. Freyler, 56, manager, mid-Atlantic region, **Allis-Chalmers Mfg. Co.** Industries Group, died Apr. 18 in Richmond, Va.

Walter C. Doutt, 52, president, **Maumee Metal Treating Co.,** Toledo, O., died Apr. 22.



New Salem-Brosius Manipulator

adds speed, safety and economy to heavy forging

This completely new Salem-Brosius all-hydraulic Auto-Floor Manipulator meets the trend of industry toward hammer and press forging of high alloy, stainless, and tool steels, and the many new extremely hard refractory-type alloys. The forging of these metals necessitates manipulating equipment of extreme ruggedness and durability.

This new machine, with its greater mass, new shock absorbing principles, heavier construction, and a new and superior hydraulic system, offers long, trouble-free service, low-cost maintenance, and increased finished forging production.

At hammer or press it raises, lowers, tilts, rotates or laterally moves the hot stock, satisfying handling requirements. Also, it can charge or draw forge shop furnaces, and operate with the facility of a fork-lift truck in billet handling. Call for a visit from a Salem-Brosius forging expert to show you how you can benefit from the use of this manipulator. There is no obligation.

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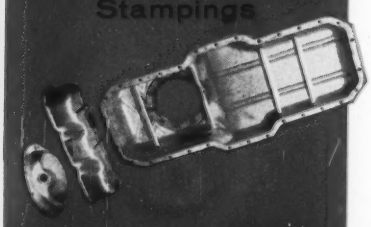
Forgings and Deep Drawn Stampings



Stampings for heavy trucks successfully produced by the wide range of Transue press equipment. Assembly operations completed by T & W include the sump ring, gasket flange reinforcements, and baffles, riveted and welded in place.

Off-the-highway truck axle, weighing 400 lbs., forged from C-1050 steel, delivered to truck builder heat-treated and cleaned, ready for machining and final assembly.

FORGINGS AND DEEP DRAWN STAMPINGS

TRANSUE & WILLIAMS

Over 50 years of experience

ALLIANCE, OHIO—USA

Bendix To Expand

Scintilla Division will spend $5 million for new plant space over next four years

A $5-MILLION plant expansion at Bendix Aviation Corp.'s Scintilla Division, Sidney, N. Y., is planned for completion by 1961.

Termed "the largest single expansion of plant facility in the division's history" by General Manager George E. Steiner, the program will add 200,000 sq ft to the present 560,000 sq ft of plant space. Employment, now 4800, will be increased 20 per cent.

Modern—The new plant will have completely modern lighting and ventilation. The first phase of construction (63,000 sq ft) is expected to be completed by Sept. 1, at which time 400 to 500 new employees will be hired.

The plant will house more facilities for automotive and aviation ignition products and electrical connectors.

American Can Cuts Costs

Construction for the installation of facilities for continuous processing of tin plate and steel plate has begun at the American Can Co.'s Milwaukee plant. This process will eliminate precut sheets and was described as a move to combat rising prices of steel plate and tin plate.

Licenses Three Companies

Shaw Process Development Corp., Port Washington, N. Y., has licensed three firms to produce cavities and cores by the Shaw process of precision investment casting. They are: Mojave Die & Engraving, Los Angeles; Osley-Whitney Inc., Westfield, Mass.; and Permanent Laboratories, New York.

Pre-Engineered Building

Republic Steel Corp.'s Truscon Division, Youngstown, has come out with an all-metal, pre-engineered building that can be delivered to job sites within two to three weeks after an order is placed, it is reported. Republic's "package" contains all siding, roofing, windows, doors and hardware. The division's construction teams assemble the unit on the job site. Al the customer has to do is provide the floor or base.

Cyclone Fence Adds Units

U.S. Steel Corp.'s Cyclone Fence Division will move into a new warehouse at Hegewisch, Ill., at the same time it opens a new sales office at 6348 Diversey Ave., Chicago.

Union Machinery Opens Plant

Union Machinery Co., a subsidiary of American Machine & Foundry Co., opened a 72,000 sq-ft bakery equipment plant at Richmond. Va.

Martin Builds at Denver

Three new structures, containing 160,000 sq ft of space and costing $2 million, will be built at the Glenn L. Martin Co.'s Denver Division, near Denver. The plant will be used entirely for the development of the U.S. Air Force's intercontinental ballistic missile, the "Titan." Earlier this year, the company was awarded a $358-million contract to design, fabricate and test it.

Sets Up Rocket Department

A rockets and missiles department has been established by the Baldwin-Lima-Hamilton Corp. at its Standard Steel Works Division, Burnham, Pa.

Florida Home for Kett Corp.

U.S. Industries Inc. will acquire Kett Corp., Cincinnati research and development firm, to staff its new technical center at Pompano Beach, Fla.

Clevite Opens Western Office

Clevite Corp., Cleveland, opened a west coast sales office at 4629 Harper Bldg., Van Nuys Blvd., Van Nuys, Calif. Cleveland Graphite Bronze Co., sleeve bearing manufacturer, will be represented by Joseph Palsulich, and Clevite Harris Products Inc., rubber parts manufacturer, by H. M. McCarthy.

$7 Million for Expansion

Canada Iron Foundries, Ltd., plans to spend $7 million for expansion and improvements in 1957, Chairman T. F. Rahilly announced. Purchase of a 54-acre tract near Hamilton, Ont., he said, was in anticipation of manufacturing a cast steel railway wheel now being produced by a U.S. company.

Westinghouse Has New Line

Westinghouse Electric Corp., Pittsburgh, has replaced induction regulators with a new line of step regulators in higher ratings. The old line will no longer be produced or sold.

Buys Stock in Iowa Firm

Neptune Meter Co., manufacturer of industrial control equipment and water meters, acquired a 50 per cent interest in Hot Spot Detector Inc., Des Moines, Iowa. Hot Spot makes temperature scanning apparatus for grain storage elevators.

Reynolds Research Center

Reynolds Metals Co. plans to build a new office building and a product research and development center in Louisville. The company now holds options on about 55 acres in suburban Louisville. Construction will begin as soon as clearance is obtained from the city zoning commission.

Consolidates Operations

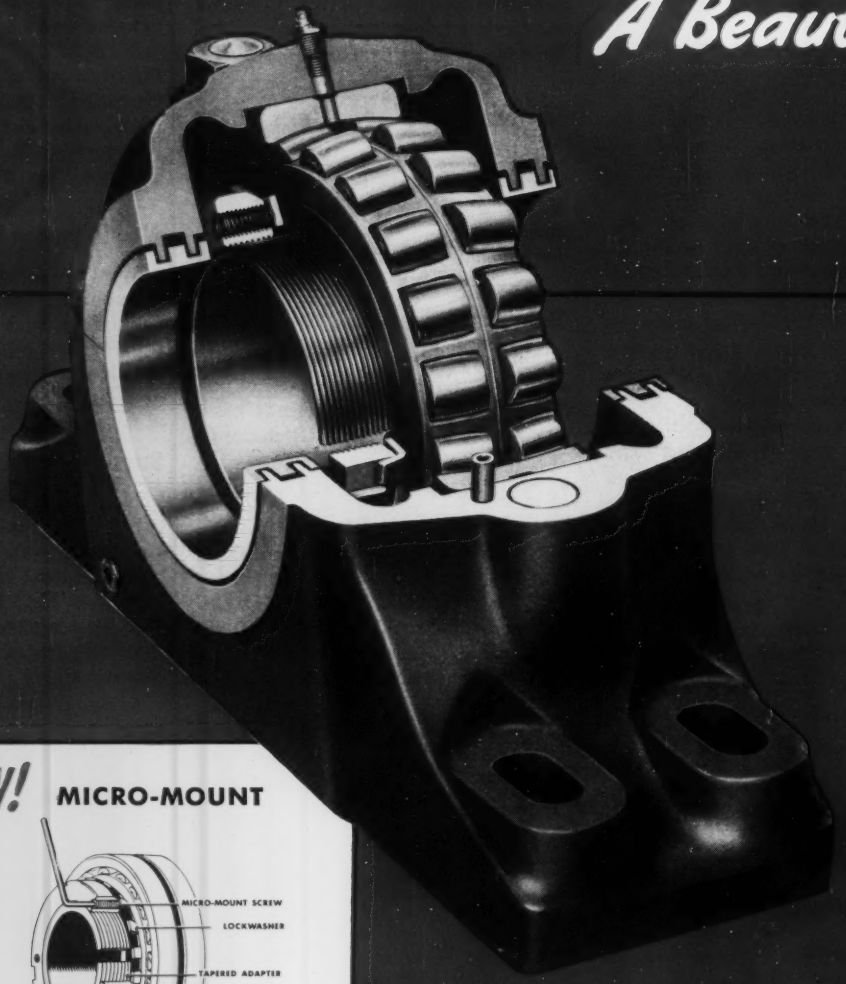
Tracerlab Inc. consolidated its east coast operations in a new $1.9-million building at Waltham, Mass. Previously housed in seven separate locations in Boston, they include manufacture of nuclear and x-ray equipment, sales offices, engineering and research departments, radiochemical facilities and general administration.

Kaman Builds Research Center

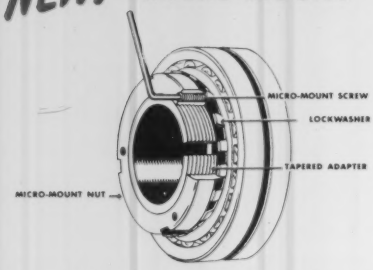
Kaman Aircraft Corp. will erect a 31,500 sq-ft engineering and administration building on 16 acres at Bloomfield, Conn. The company makes helicopters for the Navy

(*Please turn to page* 100)

A Beautiful



NEW! MICRO-MOUNT



Fast and accurate mounting is made possible by the new Dodge Micro-Mount. The Adapter is snugged up with the Micro-Mount Nut. Mounting is completed by turning the Micro-Mount Screws against the Lockwasher until bearing, adapter and shaft form an integral unit.

Now — a spherical roller bearing pillow block has been added to "America's most complete line of mounted bearings."

This new Dodge product possesses all the fine characteristics of the spherical type, plus the precision, dependability and refinements you would expect from the nation's leading supplier of mounted bearings.

Rugged housing of close-grained semisteel, in compact modern design, withstands shock loads. The new Micro-Mount Adapter seats Spher-Align solidly on shaft, *with amazing ease and speed.* A new feature of bearing design allows lubricant to enter at center of bearing and move outwardly along all bearing surfaces. Convenient drain plugs permit use of either grease or oil and provide for easy flushing. Triple seals retain lubricant.

Standardized dimensions make Spher-Align interchangeable with all other similar units. Available in expansion and non-expansion types. In stock for 2 7/16" to 8" shafts. Call your Dodge Transmissioneer — or write us.

DODGE MANUFACTURING CORPORATION • 4400 UNION ST., MISHAWAKA, INDIANA

New Bearing by Dodge —

Spher-Align

ANNOUNCING AMERICA'S NEWEST SPHERICAL ROLLER BEARING PILLOW BLOCK ... A RUGGED BEARING IN ATTRACTIVE MODERN DESIGN ... INHERENTLY SELF-ALIGNING ... EASY TO INSTALL ... EASY TO MAINTAIN ... AND FEATURING THE UNIQUE MICRO-MOUNT ADAPTER

AMERICA'S MOST COMPLETE LINE OF MOUNTED BEARINGS

DODGE-TIMKEN
Tapered Roller

SPHER-ALIGN
Spherical Roller

SC, SCM, SL
Ball

SLEEVOIL
Precision Ring Oiling

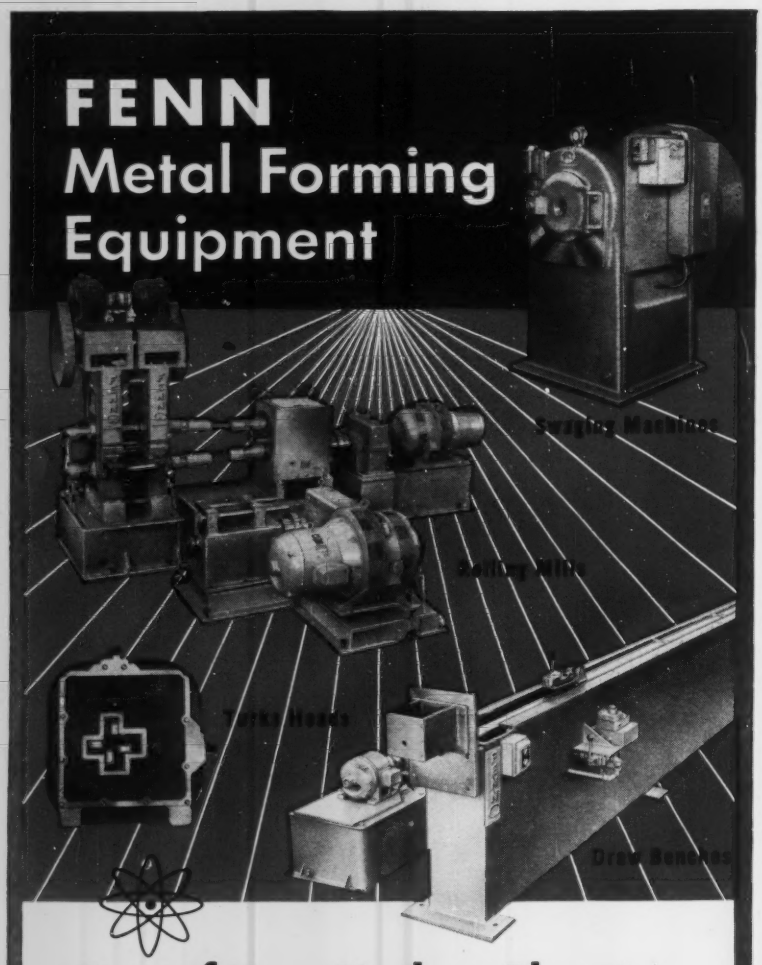
BRONZOIL
Capillary Oiling

BABBITTED
Solid and Split

PILLOW BLOCKS • HANGER BEARINGS
FLANGE BEARINGS • UNIT MOUNTS • TAKE-UPS

DODGE
of Mishawaka, Ind.

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in the yellow pages of your telephone directory — or write us.



Core of Your Nuclear Planning

FENN PRECISION ROLLING MILLS are made in a complete range of sizes and types for laboratory, pilot run and production. They are designed and built to meet the requirements of nuclear metallurgy, including the newest and toughest metals. They can be supplied in both vertical and horizontal types with complete instrumentation for remote control and hooding where necessary.

FENN ROTARY SWAGING MACHINES are the invaluable precision production tools for nuclear metal forming . . . hot or cold . . . without producing chips. A complete range of sizes with capacities from 1/32" to 6" diameter. Models also available for internal reductions and with special length dies. Compact self-contained unit facilitates hooding.

FENN DRAW BENCHES AND TURKS HEADS—Fenn makes both hydraulic and mechanically actuated draw benches with capacities from 2,000 to 40,000 pounds pull. Variable drawing and return speeds to fit your specific requirements. Fenn Turks Heads, with infinite adjustment of rolls, are a valuable accessory to draw benches for producing almost limitless shapes in wire, rod, or tube.

For engineering services or literature, write
NUCLEAR MACHINERY DIVISION

FENN

THE FENN MANUFACTURING COMPANY 402 FENN ROAD, NEWINGTON, CONNECTICUT

(*Concluded from page 97*)

and Marine Corps and produces aircraft parts and tools as a subcontractor.

Parker Aircraft Adds to Plant

Parker Aircraft Co., Los Angeles, will add a two-story research building to its engineering and development facilities. Cost of the 30,000 sq-ft addition will exceed $600,000.

Du Mont Has New ITV Line

Allen B. Du Mont Laboratories Inc., Clifton, N. J., has announced a new line of industrial, closed-circuit television equipment. Du Mont is surveying the country for distributors.

New Plant Nears Completion

International Silver Co., Meriden, Conn., expects its new, $6-million plant between Meriden and Wallingford, Conn., to be in operation by September. It will house the silver plate holloware department.

Coal Depleted, Mine Closed

U.S. Steel Corp.'s Frick District Palmer mine, near Uniontown, Pa., will be closed June 28 because of "complete exhaustion of mineable coal." The mine was opened in 1908 and has produced 16 million tons of high-grade metallurgical coal.

Stokes Opens Atlanta Office

F. J. Stokes Corp., Philadelphia, opened a sales office at 1678 Cross Keys Dr. NE, Atlanta. The firm makes production equipment for plastic molding, powder metallurgy and vacuum metallizing.

Expands Radio Receiver Plant

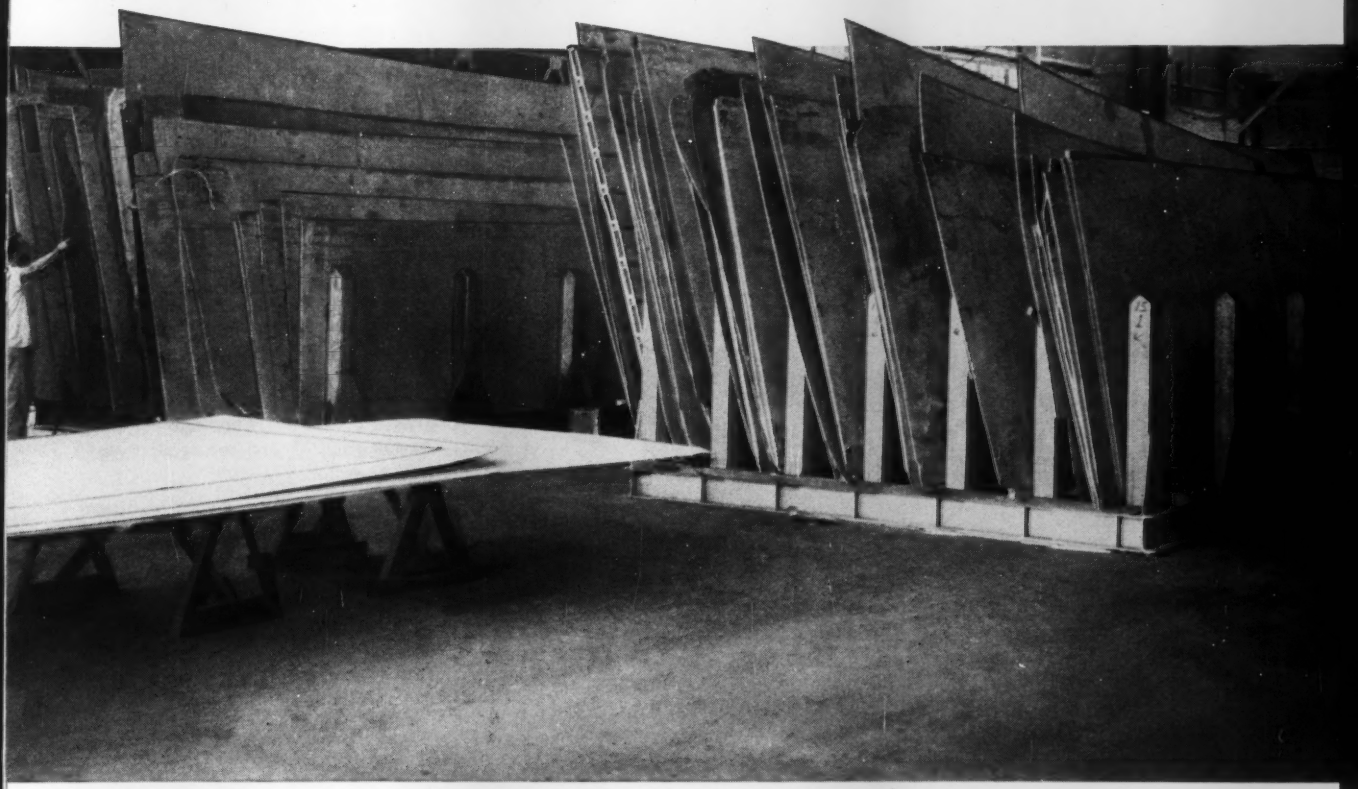
General Electric Co. will add 16,000 sq ft to the Utica, N. Y., manufacturing plant of its Radio Receiver Department. Occupancy is scheduled for September.

Sel-Rex Corp. Leases Building

Sel-Rex Corp. leased a 40,000 sq-ft building in Nutley, N. J., to house executive offices, laboratories and manufacturing facilities. Its

Available now from Carlson

...any size and shape you want in Types 405, 410 and 430 stainless plate



Carlson's stock of Types 405, 410 and 430 chromium stainless plate is the largest ever. You can order plates, large or small, and get delivery in a few days. Types 405 and 410 find wide application in petroleum processing. Type 430 is generally used for furnace parts, annealing boxes and nitric acid storage tanks. Consider the 400 series if you need stainless plates right now.

Prompt delivery isn't your only advantage. These grades cost less than chromium-nickel stainless steels and if you need irregular shapes and sizes, experienced men with specially designed equipment can cut your plates and get them out in a hurry. Carlson provides a complete service with a flexible operation to take care of your specific requirements. This combination of stock, specialization and service saves you time and money, *gives you what you want when you want it!*

G.O.CARLSON *Inc.*

Stainless Steels Exclusively

THORNDALE · PENNSYLVANIA

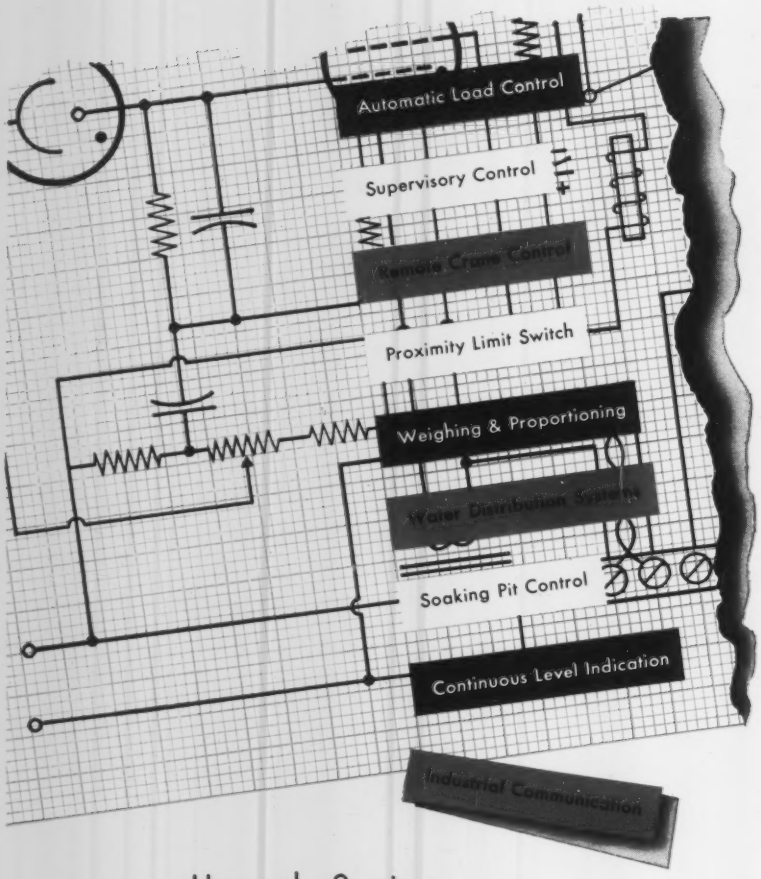
District Sales Offices in Principal Cities

PLATES • PLATE PRODUCTS • FORGINGS • BARS • SHEETS (No. 1 Finish)

Femco

CONTROL SYSTEMS

ENGINEERED FROM STANDARD COMPONENTS



Use only 2 wires
or existing power circuits.
You save time, money and motion.
Let a Femco sales engineer
help solve your problem!

UNderhill 3-3200 Femco, Inc. IRWIN, PA.

COMMUNICATION • *Electronic Engineers* • AUTOMATION

products include metallic power rectifiers, air-borne power equipment, liquid clarification filters and metal finishing equipment.

Vascoloy-Ramet Branches

Vascoloy-Ramet Corp., Waukegan, Ill., opened a branch office at 1514 Pennsylvania Ave., Indianapolis 2, Ind. It will be staffed by A. A. Strawn and H. C. Hauck. Stocks will include cemented carbide tools, blanks, toolholders, inserts and castings.

To Test Nuclear Reactor

Westinghouse Electric Corp. plans to build its own nuclear material testing reactor at Waltz Mill, Pa., 29 miles from Pittsburgh. The board authorized the project after re-evaluating the company's atomic power program.

Builds Ore Processing Plant

An ore preparation plant will be built by Union Carbide Corp. at Warwick, Va., for the processing of manganese and chromium ores. It will grade and classify 30,000 tons of ore per month when it is completed in 1958.

Nuclear Raw Materials Plant

Davison Chemical Co. Division, W. R. Grace & Co., Baltimore, is building a plant at Erwin, Tenn., which will produce nuclear reactor raw materials—basic thorium and uranium metals now supplied only by the government.

Will Increase Production

Schroeder Mfg. Inc., Long Beach, Calif., has leased a 25,000 sq-ft building, now under construction. According to President O. J. Schroeder, it will increase the firm's production to $5 million annually.

Equipment Suppliers Relocate

General Supply Co. and three other firms that make and distribute metal finishing equipment have occupied new quarters at 15583 Brookpark Rd., Cleveland. Also located at the 30,000 sq-ft facility are G. S. Equipment Co.,

You get what you want with

DANLY

PRESSES

TOP EXECUTIVES

get the speed they need for "on time" delivery

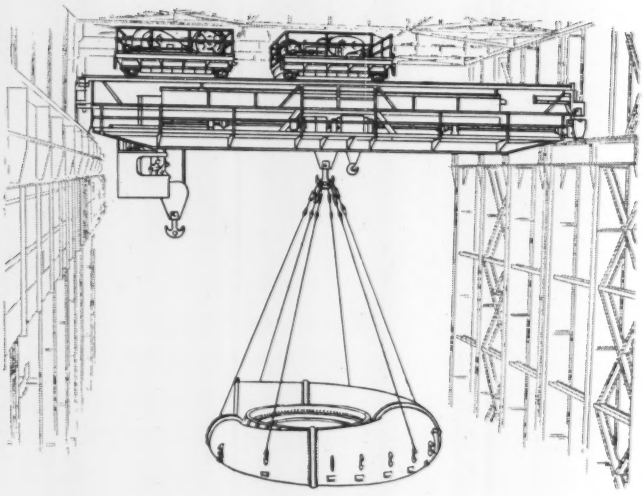
Danly Presses meet the speed and volume requirements of expanding companies. They run at top stroking speeds around the clock . . . minimize breakdown delays . . . need only minimum maintenance. Even double action types maintain a single action pace, thanks to Danly's controlled stroke slowdown. Special drives allow stroking speed to be increased without exceeding safe drawing speed. No need to "gear down" your line when single and double action presses work together. Danly's faster pace saves important time in any shop.

JUST PRINTED. *New book discusses the effect of modern presses on profits and growth of metal-working companies. Request your copy of "Industry's Wealth-Builders" from DANLY MACHINE SPECIALTIES, INC., 2100 So. Laramie Ave., Chicago 50, Ill.*

DANLY

TANDEM CRANES

LIFT 500 TONS

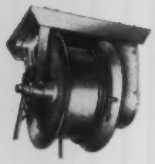


On the eastern slope of the Rockies in Montana is one of the great dams of the world. To install and maintain the massive hydro-electric generating facilities, Shaw-Box engineered and built two identical cranes and linked them in tandem with a common lifting beam. Because these cranes have the finest controls, the giant units can be lifted, moved and positioned with the utmost precision and safety. Each of the two trolleys on each crane can handle up to 150 tons. Together these powerful cranes have a rated capacity of 500 tons but are fully capable of lifting 600-ton loads.

The ability of Shaw-Box to design, engineer and build cranes of every type and capacity is widely recognized. Many of our innovations are today's standards. We conceived the first multi-motored crane. One of our latest contributions to economical overhead load handling is an hydraulic crane (capacities to 10 tons) that with a single electric motor performs all the functions of a standard crane. Dead weight is reduced: much of the electrical equipment and many moving parts are eliminated. Another recent development is the Type "SC" Crane in capacities of 5 to 20 tons. Its highly standardized components are assembled by advanced techniques — the buyer's investment is lower.

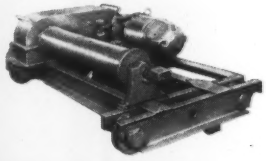
Whatever your crane requirements, you can be certain of efficient performance, low operating costs and complete safety when Shaw-Box builds a crane for you. Our engineers welcome the opportunity to serve you.

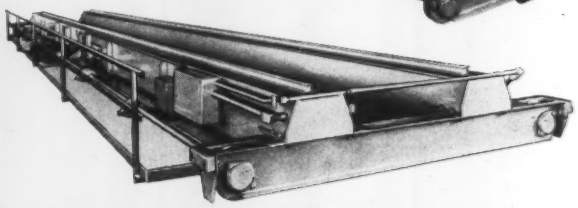
"Shaw-Box" Hydraulic Crane has only one electric motor. It powers three hydraulic motors, two to operate the bridge and one for trolley traverse. No load brake. No hoist, trolley traverse, or bridge center assembly gears. Hoisting action is produced from a cylinder reeved to give a mechanical advantage of 3 to 1. Extremely fine positioning is obtainable.



"Shaw-Box" Cable Reels automatically keep insulated conductor cable taut on crane and hoist magnets, on soaking pit carriages, mill machinery and machine tools. Spring cannot break.

Type "SC" Trolley has a higher hook lift than other unmodified standard top-running trolleys. Provides true vertical lift. Two brakes hold and control the load safely. Type "SC" trolleys are standard units, but we have pre-engineered most variations to save buyers the high cost of tailor-made designs.





Type "SC" Crane Bridge. Double-web box section girders prevent whipping or skewing even under the severest conditions. Direct drive bridge machinery has anti-friction bearings, gearing that operates in oil, and rotating wheel axles for smooth operation and long service life.

57E-6

"Shaw-Box" ® CRANES

MAXWELL MANNING & MOORE INC. M&M TRADE MARK

MANNING, MAXWELL & MOORE, INC.

SHAW-BOX CRANE & HOIST DIVISION

384 West Broadway • Muskegon, Michigan

Builders of "SHAW-BOX" and 'LOAD LIFTER' Cranes, 'BUDGIT' and 'LOAD LIFTER' Hoists and other lifting specialties. Other Divisions produce 'ASHCROFT' Gauges, 'HANCOCK' Valves, 'CONSOLIDATED' Safety and Relief Valves, 'AMERICAN' and 'AMERICAN-MICROSEN' Industrial Instruments, and Aircraft Products.

In Canada: *Manning, Maxwell & Moore of Canada, Ltd., Avenue Road, Galt, Ontario.*

G. S. Plastics Co. and the Singleton Co.

New Plant Triples Production

Pratt & Whitney Co., Inc., West Hartford, Conn., has completed a new plant at Cleveland for its Sterling Die Division. The unilevel facility will triple Sterling Die's production.

Closes Body Division

Charles T. Brandt Inc., Baltimore, has discontinued operation of its Body Division. Established after World War II to manufacture metal body trucks, it contains about 50,000 sq ft of space.

Makes Report on Sale

Pittsburgh Coke & Chemical Co., Pittsburgh, announced that the recent sale of its subsidiary, Great Lakes Steamship Co. Inc. (STEEL, Apr. 15, p. 185) brought $12 million after taxes.

Union Carbide Shortens Name

The name of Union Carbide & Carbon Corp. has been shortened to Union Carbide Corp., announced Morse G. Dial, president. The names of three divisions have also been changed: Carbide & Carbon Chemicals Co. is now Union Carbide Chemicals Co.; Linde Air Products Co. becomes Linde Co.; and Carbide & Carbon Realty Co. will be known as Union Carbide Realty Co.

ASSOCIATIONS

American Die Casting Institute, New York, has announced that Clifford L. Anthony, Hoover Co., North Canton, O., has been chosen vice president to succeed C. J. Sheehan, Aluminum Co. of America, Pittsburgh, who became president recently.

American Foundrymen's Society elected a new president and vice president at its annual meeting in Cincinnati. They are: Harry W. Dietert, chairman, Harry W. Dietert Co., Detroit, president; and L. H. Durdin, president, Dixie

Best Quality
*
Fine Quality
*
High Quality
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Quality This
*
Quality That
*
World's Best

WHAT IS QUALITY?

"Quality."

Manufacturers claim it for their products. Advertisers speak of it in product promotion. Engineers ask for it. Salesmen sell it. Purchasing Agents try to buy it.

But, what *is* quality? How do you *recognize* it? How do you *know* you have bought it?

The dictionary says quality is "that characteristic which belongs to a body or object and helps to render it such as it is." Yet, this definition is meaningless *unless quality is interpreted in terms of a product's conformance to desired specifications.*

For example, suppose you need a spring which must meet specific operating requirements. Suppose you establish allowable tolerances for important characteristics, prepare specs, obtain bids, select a supplier. If your supplier's price is in line and if, by using proper testing equipment, techniques, and modern methods of Quality Control, he is able to deliver springs which meet your specifications—*he has supplied, and you have purchased,* "quality" springs.

If your supplier goes one step further by supplying you with a record of his tests (a Quality Report), you not only *have* quality—you *know* that you have it.

Every shipment of parts supplied by Hunter automatically includes a Quality Report (Q. R.) on tested characteristics.

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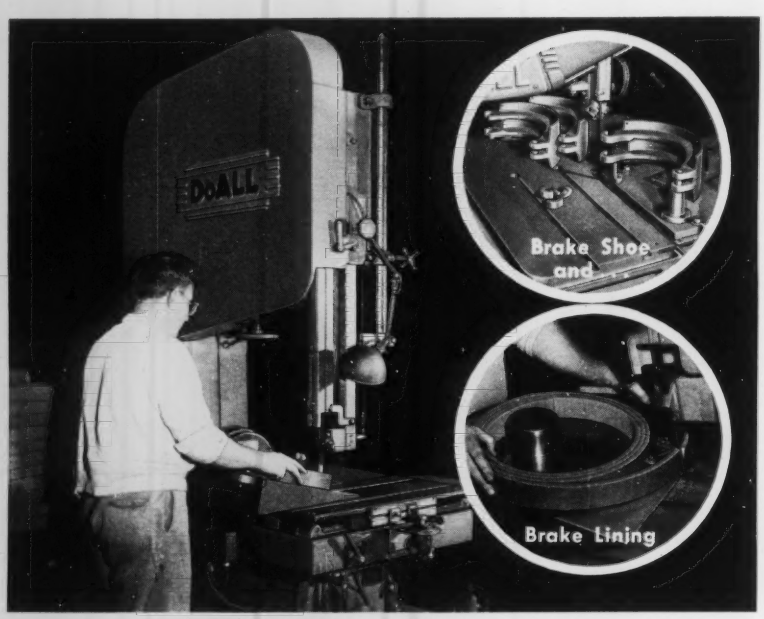
HUNTER SPRING COMPANY
19 Spring Avenue, Lansdale, Pennsylvania
SPRINGS • STAMPINGS • TEST APPARATUS



CUTTING THE COST of brakes for your car . . .

New "Tools" Best Answer to The Profit Squeeze

The squeeze is getting tighter in many quarters. Wage costs have gone up faster than employee productivity. Price increases have not kept pace with higher costs.

In a squeeze like this, the only thing that gives is profits. Carried very far, this hurts everyone.

Increased productivity of workers through use of new and better "tools" can ease the squeeze. It takes skillful management to adopt the technological opportunities throughout industry for production savings.

The illustrations above are a case in point. The manufacturer formerly used a shearing device to cut brake linings to desired lengths. Now, a DoALL band machine does the job in 15% less time. Six machines cut 390 pieces per minute.

Even more substantial time savings are made in trimming metal brake shoe lugs as shown in the inset photo. Two lugs are trimmed off in 15 seconds. This job formerly took 1 minute 30 seconds on a milling machine . . . 6 times as long.

Modern cars have better brakes at reasonable prices, thanks to new and better "tools".

Wherever there is manufacturing, there is an opportunity to increase human productivity and reduce costs with newer, better tools. The band machine is one of such tools that is doing hundreds of production line jobs faster, better and cheaper than ever before.

Reprints of this series on economics available for your employees.

HOW TO CUT COSTS with production band machining is shown in movies, literature and actual machine demonstrations available upon request without obligation. Call DoALL locally or write.

The DoALL Company
Des Plaines, Illinois
38 Local Sales-Service Stores

E-25

Bronze Co., Birmingham, vice president.

Lead Industries Association, New York, held its 29th annual meeting in Chicago and re-elected all officers. They are: Andrew Fletcher, president, St. Joseph Lead Co., New York, president; Kenneth C. Brownell, president, American Smelting & Refining Co., Barber, N.J., vice president; Joseph A. Martino, president, National Lead Co., New York, vice president; Miles M. Zoller, vice president, Eagle-Picher Co., Cincinnati, vice president.

American Zinc Institute, New York, chose new officers at its board meeting in Chicago. They are: President, S. D. Strauss, vice president, American Smelting & Refining Co., New York; vice presidents, J. D. Bradley, Bunker Hill Co., San Francisco; Clarence Glass, Anaconda Sales Co., New York; H. L. Young, American Zinc Sales Co., St. Louis. E. V. Daveler, American Zinc, Lead & Smelting Co., New York, was re-elected treasurer; and J. L. Kimberly, executive vice president and secretary.

NEW ADDRESSES

Thor Power Tool Co., Chicago, moved its Houston branch office to 5503 Lawndale Ave. R. F. Caslin is branch manager.

Jones & Lampson Machine Co., Springfield, Vt., moved its Cleveland district office to Room 105, 25000 Euclid Ave. John Neronsky is district manager.

Blaw-Knox Co., Pittsburgh, moved its Chicago office to 36 S. Wabash Ave. Midwest headquarters remains at 180 N. Wabash Ave.

B. A. Wesche Electric Co. opened its new 25,000 sq-ft plant at 9027 Shell Rd., Blue Ash (Cincinnati), O. The firm makes special design and torque motors and collector rings.

Ceco Steel Products Corp., Chicago, opened sales offices in Tampa, Fla., and Phoenix, Ariz. John

E. Hanskat heads the Tampa office, and Lester A. Holmes has been placed in charge of the Phoenix office. The company manufactures metal building products.

REPRESENTATIVES

Cleveland Punch & Shear Works Co., Cleveland, appointed Swind Machinery Co., Philadelphia, as its sales agent for eastern Pennsylvania, southern New Jersey, Delaware, Maryland and District of Columbia. The firm's products include power presses, fabricating tools, punching tools and dies.

Youngstown Foundry & Machine Co., Youngstown, manufacturer of rolling mill rolls and equipment, appointed these representatives: R. J. Myers, Claremont, Calif., and Donald Loeser, Walnut Creek, Calif.

Dixon Sintaloy Inc., Stamford, Conn., appointed Associates Sales Co., Wantagh, N. Y., as a New York sales agent.

Acheson Colloids Co., Port Huron, Mich., named Apco Industries Ltd., Leaside (Toronto), Ont., as Ontario and Quebec distributor of "dag" dispersions of colloidal graphite, molybdenum disulphide and other solids.

Wonder Building Corp. of America, Chicago manufacturer of preengineered trussless steel buildings, appointed these distributors: Wonder Building of Cleveland, Cleveland; Hillard Grain Co., Ozark, Ark.; Prairie Implement Co., Stuttgart, Ark.; and Murphy Lumber & Supply Co., Baton Rouge, La.

North American Refractories Co., Cleveland, appointed Brumley-Donaldson Co., Los Angeles to distribute Quality Tested Missouri fire clay brick and related specialty refractory products.

Reynolds Metals Co. named Metals Supply Co., Emeryville, Calif., as a distributor of aluminum mill products and architectural aluminum.

Warner Electric Brake & Clutch Co., Beloit, Wis., appointed Samuel Harris & Co. Inc., Chicago, to distribute the products of its Industrial Division.

Specify *Michigan* Tubing for economy and versatility

The ABC of MSIT
A ALWAYS MAKES POSSIBLE
B BETTER PRODUCTS
C AT LOWER COST

A Quality Product

ROUND

¼" to 4" O.D. 7 to 22 gauge

SQUARE	Gauge	RECTANGULAR
⅜" to ¾"	16 thru 22	⅜" minimum side to 5" maximum side
¾" to 1"	11 thru 22	
1" to 2"	11 thru 20	
2" to 3"	11 thru 18	

Carbon 1010 to 1025

Standard Sizes

Tube Diameter O.D. Size	Maximum Wall Decimal	BWG Gauge	Minimum Wall Decimal	BWG Gauge
¼	.065	16	.022	24
½	.083	14	.022	24
⅝	.095	13	.022	24
¾	.095	13	.022	24
⅞	.095	13	.028	22
1	.095	13	.028	22
1⅛	.095	13	.028	22
1¼	.095	13	.028	22
1⅜	.095	13	.035	20
1½	.095	11	.035	20
1⅝	.120	11	.035	20
1¾	.120	11	.035	20
1⅞	.120	7	.035	20
2	.180	7	.035	20
2⅛	.180	7	.035	20
2¼	.180	7	.035	20
2⅜	.180	7	.035	20
2½	.180	7	.035	20
2⅝	.180	7	.035	20
2¾	.180	7	.035	19
2⅞	.180	7	.042	19
3	.180	7	.042	19
3⅛	.180	7	.042	19
3¼	.180	7	.042	18
3⅜	.180	7	.049	18
3½	.180	7	.049	18
3⅝	.180	7	.049	18
3¾	.180	7	.049	
3⅞	.180			
4				

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Michigan has been manufacturing tubular parts for leading manufacturers. This acceptance of Michigan tubing has been won by meticulous attention to customer requirements and the supplying of the very best in tubing. The following advantages of low cost manufacture and utmost dependability are yours when you specify Michigan for tubular parts in the fabrication of your products:

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2. It is always of uniform strength, weight, ductility and weldability;
3. It can be flanged, expanded, tapered, swaged, beaded, upset, flattened, forged, spun closed, fluted and rolled.
4. Complete facilities for the COLD DRAWING, ANNEALING and TESTING of tubing we manufacture.

Michigan RESISTANCE WELDED STEEL TUBING
THE OLDEST NAME IN ELECTRIC
STEEL TUBE PRODUCTS CO.

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for engineering and technical help in the selection of tubing best suited to your needs.

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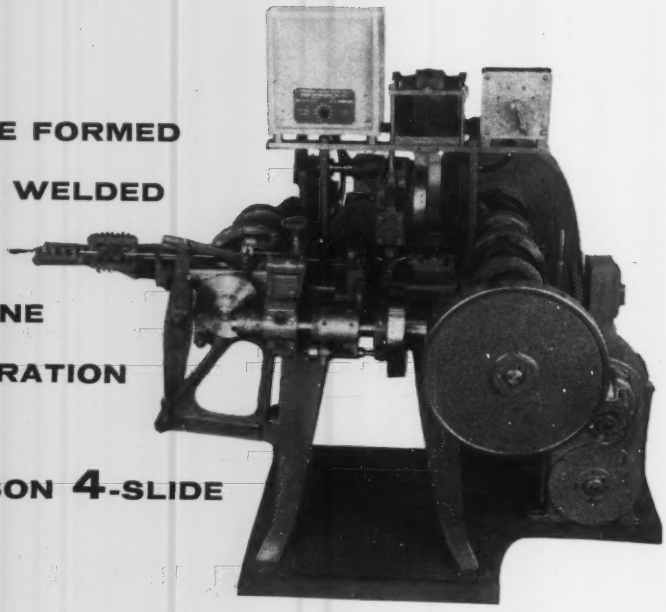
DISTRIBUTORS: Steel Sales Corp., Chicago, St. Louis, Milwaukee, Indianapolis and Minneapolis—Miller Steel Co., Inc., Hillside, N. J.—Service Steel Div., Van Pelt Corp., Los Angeles, Calif.—Donald A. Harston, Cleveland, Ohio—Globe Supply Co., Denver, Colo.—W. A. McMichaels Co., Upper Darby, Pa.—William P. Hall & Associates, Dayton, Ohio—John Emery West, Miami, Florida—Gary A. Osborne, Buffalo, N. Y.—Earle M. Jorgensen Co., Houston, Texas

WIRE FORMED AND WELDED IN ONE OPERATION WITH NILSON 4-SLIDE



Garter loop formed and welded in one fast operation by Nilson 4-Slide.

Production is increased more than 25% by Hawie Manufacturing Company using a #1 Nilson 4-Slide with welding attachment which eliminates need for ferrule loops in the manufacture of hose supporters. .062 soft basic wire is formed with ends welded in one automatic operation at a conservative 105 pieces per minute. Additional savings are realized in eliminating cost of ferrule.

Another example — Drapery hook is formed with two wires entering 4-Slide simultaneously and automatically welded together at point of contact.

Nilson 4-Slides will produce many types of wire forms similar to the part shown here in which two pieces must be welded or otherwise closed together. By the mounting of automatic welding equipment on the 4-Slide, such parts can be produced in one fast, accurate operation at minimum cost. Nilson 4-Slide Wire Forming Machines are available in a wide range of sizes to handle basic steel wire from 1/32" to 1/2" diameter.

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Get Set for Metalworking's Fabulous Future . . .

marketing

a broader concept

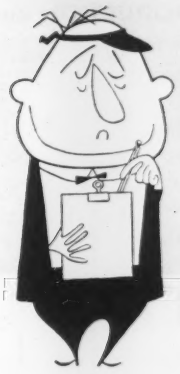
• How big are your markets? Where are the shifts occurring? How do you integrate your direct selling and promotion?

STEEL, in its June 17 issue, will answer these and many more questions.

Check to see how and why a new, broad concept in marketing is being adopted by more and more metalworking companies. The fifth installment in STEEL's 1957 Program for Management, appearing next month, is one of a ten-part series. Articles published to date:

1. **The Care and Feeding of the Junior Executive**
   (Feb. 11, p. 93)
2. **Grooming Middle Managers**
   (Mar. 18, p. 93)
3. **Profit Sharing**
   (Apr. 15, p. 115)
4. **Inventory Management**
   (May 13, p. 109)

Extra personal copies of these Program for Management articles are available until the supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, O.



Inventory Management

Road to Lower Costs

A MAKER of small appliances was losing ten distributors a month.

A PRODUCER of scientific instruments woke up to find his prices were no longer competitive.

A SUPPLIER of auto parts became alarmed by the rising cost of maintenance.

Each problem, although superficially different, was solved in the same basic way—by starting an inventory management system.

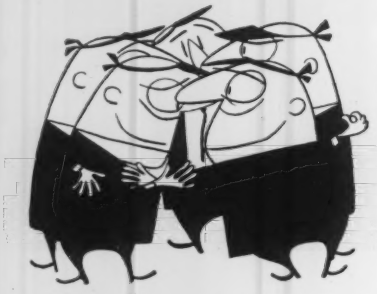
- The appliance manufacturer used it to discover how to stock his distributors with the quantity and kind of products they wanted.
- The maker of scientific instruments cut costs nearly one-third and soon was able to make his prices competitive as a result of inventory control.
- The auto parts firm had three plants within a 30-mile radius, each with duplicate maintenance supplies. Their consolidation at one plant did the job. Stocks were reduced by two-thirds and maintenance costs were cut in half.

Experts Speak—Why are inventories such a problem?

Two reasons are forwarded by Prof. Joseph F. McCloskey of Case Institute of Technology, Cleveland. "We are only now beginning to refine and adapt mathematical and other tools to deal with inventory problems. Also, the economy is expanding physically at a tremendous rate. And many companies haven't adjusted. They're trying to do a gallon-size business with pint-size methods."

The usual situation, says Carl John of Ernst & Ernst, the Cleveland accounting and management consulting firm, is that a company tries to operate today with inventory controls that were suitable 15 years ago, adding: "It's amazing the number of companies that keep virtually no records necessary for inventory management. They make a fetish of minimizing paper work. As a result, they're often saving pennies on clerical expense but losing dollars that the paper

How Departments Can Do Day-to-Day



MARKETING

Make sales forecasts by period.
Receive customers' orders.

ENGINEERING

Prepare parts lists and bills of materials.

PRODUCTION and MATERIAL CONTROL

Use the sales forecasts, as modified by customers' orders, and the parts lists and bills of materials to prepare a manufacturing schedule and determine material and parts needs by periods.

Enter this information on an allocation and disbursement card (page 112) which becomes

work could have saved."

Says Henry W. Spitzhoff, a vice president for Robert Heller & Associates, the Cleveland management consulting firm: "Inventories are like the storage tanks in hydraulic systems. Properly managed, they provide useful pools of resources that can be used to optimize costs and provide good customer service. Improperly managed, they'll result in all sorts of malfunctions in a company."

The Small Business Administration cites inventory malfunctions as the reason for the failure or near failure of a "sizable" number of small manufacturers. Some authorities even believe that several recessions—notably the ones in 1921 and 1954—came as hangovers after binges in inventory building.

The Case of XYZ

What is inventory management? How can it be adopted? What will it do?

To give you the answers, STEEL invented the sad case of XYZ Electronics Inc. whose management is at a loss to explain why the firm is on the edge of bankruptcy even though its sales of $14 million last year were seven times what they were in 1946.

To help find the remedies for XYZ's plight, STEEL retained three consultants—Heller, Ernst & Ernst and an operations research team from Case.

Background—XYZ produces devices used in television sets, radios and recording equipment. It's fundamentally a one-product company, although it makes four variations to satisfy the slightly different specifications of its four major customers. Last year it made and sold 48 million units and carried an average inventory of 16 million parts to support that volume. Its sales were four times what they were in 1950, and its inventory had tripled.

The company's accounting procedures are primitive ("because we have such a simple business," protests President John Xavier). Its sales are nearly all handled by one man ("because we have only four important customers," explains Vice President William Young). It has no formal purchasing department and buys on hunch ("how else in a business as screwy as television?" asks Vice President Joseph Zilch who doubles as purchasing agent and production manager).

Squeezed—Competition has increased in the last two years, and XYZ doesn't dare raise prices. Its profit margin has steadily declined, although its volume has held up well, even increased. If something isn't done, it faces a financial loss this year. What's more, its two most important competitors expect to make record profits this year, although their prices are the same and their volume is less than XYZ's.

What's the Matter?—A study by Heller people reveals that Mr. Zilch is a production wizard, has

Job of Better Inventory Management

the central record and key by which inventories are managed.

Use the needs for materials and parts as the basis to issue a purchase order requisition, which is passed along to the purchasing department.

PURCHASING

Production and material control's requisition is the authority to issue a purchase order (see page 114). The date and particulars of this order are posted on the allocation and disbursement card (page 112). A copy of the order goes to the vendor. Another copy goes to material control. Another to purchasing's alphabetical file. Another to purchasing's numerical file. Another to accounting. Another to the receiving department.

RECEIVING

When the parts or materials arrive, five copies of a receiving report are made to be distributed: 1. To material control to provide information entered on the allocation and disbursement card (page 112). 2. To purchasing's numerical file. 3. To purchasing's alphabetical file. 4. To the accounting department. 5. To the receiving department.

If only part of the order has been received, the receiving copy and the receiving department's copy of the purchase order go back to the receiving department's file and are reprocessed (as above) when the rest of the shipment comes in.

modern equipment, good layout and some ingenious material handling arrangements. Little can be done there. Plant efficiency is good; wage rates are comparable to the industry's. Because the product is small and light, freight is no factor.

Mr. Xavier invented the XYZ unit and has contributed several design improvements that keep it technically abreast of competition.

Mr. Young appears to be a good salesman, and his selling expenses are low.

All three consultants worked up a road map of XYZ functions from top to bottom. It shows one big fault—no inventory management. Buying patterns are erratic and expensive. There is no sales forecasting, no co-ordination among sales, purchasing and production.

Remedies

The consultants agree that inventory management is like the "Y" in the company's name—in the middle. It's an integral part of the operation that should be coordinated with the other functions.

Heller suggests a management committee composed of Xavier, Young and Zilch to study the inventory situation. Because the key to sound inventory policy is the sales forecast, Salesman Young is nominated as committee chairman.

Predictions—"Periodic sales forecasts should be made at once," advises John W. Field, one of Heller's consultants. Suggested is an annual forecast, to be revised at least every quarter—oftener if necessary. Besides the forecast, the whole process of production planning should be analyzed to determine correct inventory levels and material needs.

Purchasing should be made on the basis of this analysis, with quarterly adjustments if conditions change. The old buying pattern indicated that 12 or 13 separate purchases were made annually. Because of an administrative and clerical cost of $50 per purchase, that meant an expense of at least $600 each year. And purchases made that frequently meant discounts were low.

Savings—Recommended are purchases only four times annually, cutting the administrative expense of buying to $200. Added discounts stemming from larger quantities will bring an additional saving of at least $500 each year.

The consultants recommend that Young be given responsibility to administer the inventory management program and that Zilch be relieved of any direct responsibility for the day-to-day working of the buying function. A secretary can handle the clerical detail under Mr. Young's supervision.

Reasoning—Two reasons are behind that recommendation: 1. Zilch is temperamentally unsuited for purchasing. He's a production man, impatient with clerical detail and so interested in always having enough parts on hand to facilitate

Key to Allocation-Disbursement Form

1. PROCUREMENT CODE
To show accumulated lead time from assembly date back to necessary order initiation date.

2. FABRICATION CODE
To indicate length of time necessary to process material.

3. CORRESPONDENCE FILE NUMBER
To identify miscellaneous memos and other correspondence pertaining to the part.

4. STOCK ROOM AND BIN NUMBER
To identify the stock's location for inventory and recount purposes.

5. ORDER POINT AND ORDER QUANTITY
To indicate the point at which to reorder (taking into account allowances for cushions and contingencies) and the most economical quantity to order (taking into consideration available storage space and inventory valuation limits).

6. PART NUMBER AND PART NAME
To provide identification.

7. DELIVERY CODE
To indicate time required for material to be delivered from the moment the purchase order is placed.

8. LATEST E.C.N. NUMBER
To show engineering change notice (E.C.N.) when design modifications call for changes in parts.

9. MODELS
To list models on which part is used.

10. QUANTITY PER UNIT
To show number of pieces per model.

11. WEEK OF
To indicate manufacturing schedule week.

12. MANUFACTURING SCHEDULE
To show quantities that are actually to be manufactured in a production period (this schedule should be prepared at least three weeks before starting manufacture).

13. ORDERED
To record these data showing the origination of a purchase order by the purchasing department: Date (of the purchase order). Manufacturing Order No. (number assigned authorizing release for manufacture). Purchase Order No. (number assigned by purchasing). Quantity (as ordered by purchasing and not necessarily agreeing with the purchase requisition quantity).

14. RECEIVED
To record these data showing receipt of material: Date (when material is received). Order No. (identifying receiving report). Quantity (of good pieces received). Balance on Order (if the full amount hasn't been received).

15. ALLOCATED
To record data showing quantities apportioned to current orders in advance of production. Under the code should be the date when the allocated material will be used.

16. DISBURSED
To record these data to show all planned issuances: Date (issuance date out of stock as recorded on the material requisition). Quantity (to be released). Order No. (the manufacturing number to serve as authority for stock issuances and/or release authority). Balance on Hand (to show stock status of material that should be in stock room).

17. AVAILABLE STOCK
To find this figure, subtract total allocations (in section 15) from the balance on hand (in section 16) to get what remains for future orders.

production that he usually buys too much. But he purchases small quantities at such frequent intervals that he doesn't realize the large total volume he gets. 2. Because the sales forecast is the key to inventory control, it's logical that the sales or marketing director be responsible for the program.

Somebody should be in charge of any program. It doesn't matter too much who he is as long as he is temperamentally suited to weigh the cost of carrying inventory against the cost of acquiring it. The situation is ideal if the right man also heads up marketing.

Reductions — Heller consultants have another suggestion. Inventories to support the same sales volume can be cut in half and still be at safe levels.

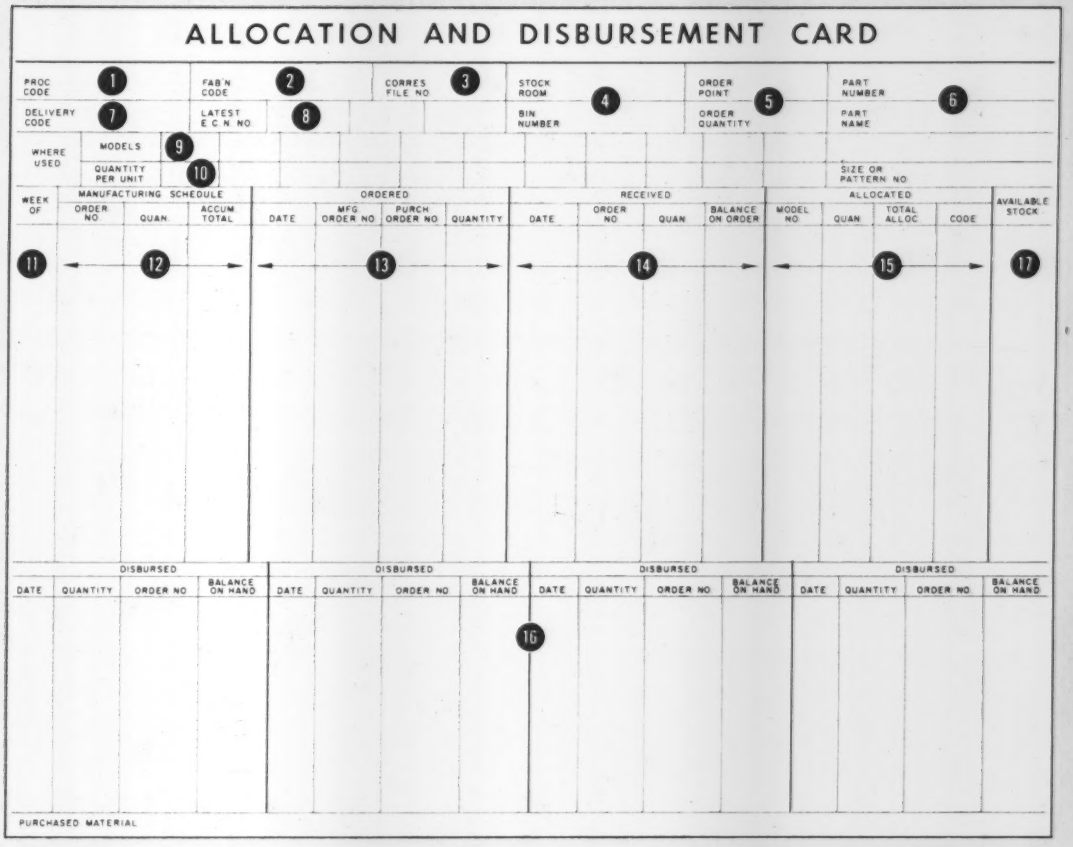
It can be done by producing one product instead of four slightly different ones, each requiring separate stocks to maintain the required production volume. (See page 116 for the mathematics.) Needed first is a marketing job to learn if the same product can be used by all four customers. If that's feasible, the next task is to sell the buyers on the idea.

Arithmetic—Statistical data developed for inventory management, such as those shown in the new book, *Tested Scientific Inventory Control*, by W. Evert Welch (published by Management Publishing Corp., Greenwich, Conn.) indicate that inventory changes should be proportionate to the square root of the changes in production volume. If you go from a volume of three to a volume of 12 and needed an inventory of two to support three, your new volume of 12 can be supported by a stock of four units.

Similarly, if you can standardize as XYZ plans to do, you can make substantial progress in lowering your inventory. Weeding out slow-moving product lines or obsolete products can also do wonders for your inventory levels.

Stock Levels — Inventory management usually results in a lowering of stocks, but sometimes it's more economical to raise them. For example, inventory management policies at U.S. Steel Corp.'s American Steel & Wire Division sometimes dictate increases in stocks—on the basis of such factors as availability and price.

A large automotive supplier found it had to increase stocks for 5 per cent of the thousands of items it inventories. Inventory management studies showed that inadequate supplies were losing sales. Over-all, the company cut its inventory valuation nearly 20 per cent through improved controls. That freed more than $1 million for other uses.



Ernst & Ernst

The inventory trend should be down, too, at XYZ. That will free funds for other uses and cut inventory carrying costs. XYZ's charges are about the industry average—12 per cent per year of the average valuation.

Control at XYZ

The theory for XYZ's inventory management is beginning to shape up. What about the practice—the procedures that clerical help can perform to make it work?

Ernst & Ernst's Carl John suggests a perpetual inventory setup for maximum-minimum quantities. That type control is applied to the most costly items or to parts which are critical and difficult to get.

Here's How—The average weekly usage of a part is determined by dividing the previous 12 months' usage by 52 and adjusting proportionately downward if the standardization proposal works out. That quantity should be adjusted to reflect any anticipated changes in usage.

Lead time—from the date the order is placed until its receipt from the vendor—must be determined. Express the time in weeks, and determine it by reviewing the delivery history from records. (The Zilch records are spotty, but enough can be pieced together to get a fair picture. Their accuracy can be upgraded by experience.)

Time Element—XYZ also must determine fabrication time. That, plus the lead time needed to get parts, plus a contingency factor of two weeks is the procurement time. The order point will be equal to the procurement time multiplied by the average weekly usage.

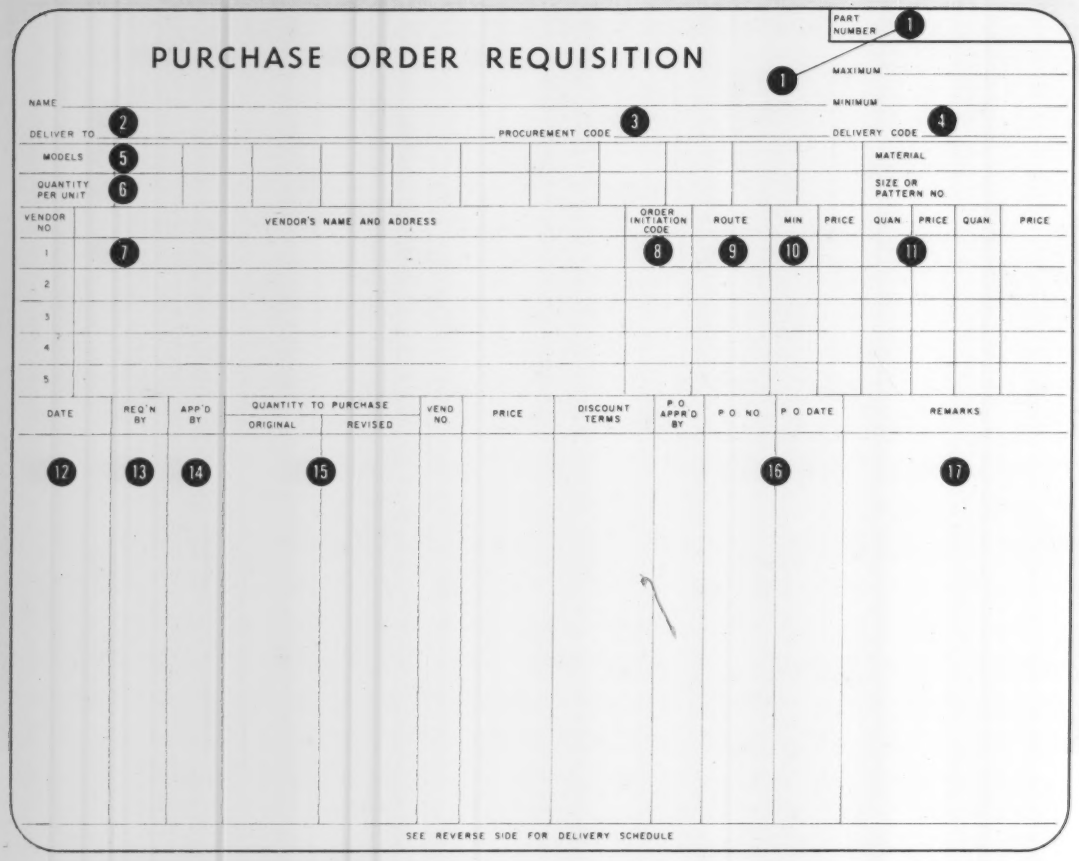
Order quantities should vary in relation to the dollar value of a 13 weeks' supply, the number of weeks' supply decreasing as the dollar value increases. The purpose of this ordering method is to lower the inventory investment in the more costly items, thus increasing average inventory turnover.

Here's the way hypothetical amounts could be ordered:

Value of 13 Weeks' Supply	Order Quantity
$ 0 to $25.00	52 weeks
25.01 to 100.00	20 weeks
100.01 to 250.00	16 weeks
250.01 to 500.00	13 weeks
500.01 to 2000.00	10 weeks
over 2000.00	8 weeks

It's mathematically routine to figure optimum quantities for various usages and dollar values. The book mentioned (*Tested Scientific Inventory Control*) is one among many replete with tables and formulas on the matter.

Key—The medium for perpetual



inventory control is the allocation and disbursement card (page 113).

To keep clerical effort to a minimum, Mr. John suggests setting up a parts usage recap file. The usage of each item can be posted in it daily. At the end of the week, usage for the period can be transferred to the allocation and disbursement card.

Excesses — Ernst & Ernst also suggests special attention to analysis and disposal of excess inventories and obsolete materials. A physical check turned up sizable quantities of this type material in odd corners of the XYZ plant.

A quick way to do this is to review each allocation and disbursement card following each calendar quarter. Check whether quantities are in excess of four months' supply, or in excess of one year's supply. Ernst & Ernst advises XYZ's Young to review all items in excess of four months' supply and dispose of inventory quantities in excess of one year's supply. Improved management should eventually make such excesses a rarity.

LIFO vs. FIFO—In the accounting area, H. T. McAnly, partner, Ernst & Ernst, also proposes that XYZ shift from FIFO to LIFO in costing its inventories. LIFO permits more realistic costing on the basis of most recent price levels.

Operations Research?

What about Case Institute's OR (operations research) approach? It involves the study of all the factors in a problem. Case Institute's OR team would tackle XYZ like this:

1. Draw a road map of the company, just as Heller and Ernst & Ernst did. It will often reveal incongruities. (In XYZ's case, purchasing methods were snafu. In another case, OR found that part of the solution was even simpler. Two offices handled paper work preliminary to ordering and processing. Both were necessary, but they were at opposite ends of a large plant. After they moved together, the time saved went a long way toward solving the problem.)

2. Formulate the problem.

3. Put XYZ's system into mathematical terms (called "making a model"). The technique is to sort out the variables, such as demand, which can't be controlled. OR makes assumptions, such as constant demand, widely fluctuating demand, moderately fluctuating demand. It works out answers on the basis of each set of assumptions. Another set of figures covers variables you can control—output, number of shifts, etc. The trick is to change them. For example, test the effects of changing production runs. You are looking for least costs.

Experiments with XYZ's controllable variables showed that its management had arrived at correct production amounts by intuition. That's often true. Case Institute's Professor McCloskey points out that OR often verifies seat-of-the-pants decisions, but he

Key to Purchase Order Form

1. PART NUMBER AND NAME
To provide card identification.

2. DELIVER TO
To identify location of storage area to which material will be delivered.

3. PROCUREMENT CODE
To represent accumulated lead time from assembly date back to order initiation date (includes fabrication inspection, processing, assembly and vendor lead time).

4. DELIVERY CODE
To indicate time required for material to be delivered after purchase order has been placed.

5. MODELS
To list models on which part is used.

6. QUANTITY PER UNIT
To show number of pieces per model.

7. VENDOR'S NAME AND ADDRESS
To be supplied by the purchasing department.

8. ORDER INITIATION CODE
To indicate lead time required by the various vendors as supplied by the purchasing department.

9. ROUTE
To provide information to facilitate tracing of incoming shipments by indicating carrier employed.

10. MINIMUM
To show order quantity as advised by purchasing to obtain reasonable quantity discounts.

11. QUANTITY AND PRICE
To provide information necessary for determining economical ordering quantities.

12. DATE
To show requisition date.

13. REQUISITIONED BY
To show initials of originator of purchase requisition.

14. APPROVED BY
To give authority to issue purchase order.

15. QUANTITY TO PURCHASE
To record both original purchase requisitions and any revisions.

16. PURCHASE ORDER NO. AND PURCHASE ORDER DATE
To be used for the records and when authority for reductions in order quantities are necessary.

17. REMARKS
To show unusual transactions, release of material for further processing under a new purchase order, descriptive data pertaining to reductions in orders resulting from changes in schedule, etc.

Ernst & Ernst

warns: "The hunch player has the satisfaction of knowing that he's right. Yet, intuition can't be on the beam all the time. Correctly used, OR is right consistently."

4. After the model is set up, the job is to get data from operations. Here's a crucial problem for XYZ. Its data are poor. The data-gathering job at XYZ will take a year because the OR team has to start virtually from scratch.

Lesser Evil — "As companies grow, they must resign themselves to more paper work," warns Professor McCloskey. "That's a lesser evil than working virtually in the dark, as XYZ is."

Not many firms as small as XYZ would try OR, but its management wants a complete answer. Case teams often recommend the use of big electronic computers and a permanent OR man in the company to solve problems. But that's not justified for XYZ.

Start Simply—In fact, all three consulting groups recommend that XYZ start off with the simplest possible accounting system (essentials are in exhibits on pages 110, 112 and above). Only for the more sophisticated is extensive mechanical equipment feasible. And no equipment can help if the inventory management system is wrong.

Users are enthusiastic about the speed that computers offer. For example, Jack Mehring, director of purchasing and production planning for Clevite Corp.'s Cleveland Graphite Bronze Co., has had an operations research department (complete with computer) for two years to do statistical studies of inventory levels and similar jobs. Case Institute started the program.

Example — A sample of where and how OR works: CGB uses steel strip that must be coated, milled, rolled and annealed—a process taking three to six weeks. An OR study determined what alloys and grades should be on hand and in what quantities. One result was that the company found it needed to have many of its expensive alloys on hand only a week.

OR will work one of three ways:

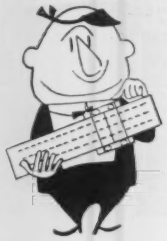
1. Set up your own people with mathematical backgrounds. They can be supplemented by an occasional consultant, usually found at the local university.

2. Start with your own man and pirate a man from the outside who's an OR expert.

3. Hire an outside OR team to work with you. A team of two or three for your own staff will work with two or three from the consultant's staff. Eventually, the outside men drop out, and the work continues with the company men.

The out-of-pocket cost of No. 3 often ranges from $50,000 to $100,000, not counting the expense of company men. No. 2 is frequently deceptively expensive because the pirated man can't be hired cheaply. No. 1 is costly because it's slow.

If you establish your own OR department, figure a budget of about $25,000 a year to maintain one OR man (salary, equipment, etc.). The expense can be recov-



The Mathematics of Inventory Changes... When production volume increases

The rule of thumb is that an inventory increase should be proportionate to the square root of the factor of increase in production volume. Here's how it works out:

Product	Production Volume	Inventory	New Volume	New Inventory
A	3	2	12	4
B	3	2	12	4
C	3	2	12	4
D	3	2	12	4
	12	8	48	16

...When the product line is reduced, as with standardization

The rule of thumb is that an inventory reduction should be proportionate to the square root of the factor of reduction in the number of products. Here's how it works out:

Product	Production Volume	Inventory	New Volume	New Inventory
E*	12	4	48	8

*Standardized into one from Products A, B, C, D.

ered many times over in the economies GR will turn up.

Summary

"Inventories are one of the biggest sources of headaches for industry today," believes Lloyd Hackley, American Steel & Wire's director of production planning and chairman of its inventory committee.

He and other experts believe that migraines can be cured with this four-way remedy:

1. Establish a co-ordinated inventory system. (At American Steel & Wire, Mr. Hackley's committee consists of representatives from sales, accounting, purchasing, production planning and operating departments.)

2. Do a continuing and careful job of sales forecasting. (AS&W is now finalizing its June estimate and making tentative forecasts for July and August and the fourth quarter this year and the first one next year.)

3. Fix responsibility for the administration of the inventory management. (Mr. Hackley is the man at AS&W.)

4. Keep adequate records. (AS&W takes a physical inventory once a year and makes frequent spot checks, especially on critical materials.)

Cleveland Cap Screw Co. is setting up a plan that'll have one inventory control man out counting all the time to keep computer records up to date. It's an example of a company that has outgrown its old control system and must adopt a more up-to-date setup for its new factory and five warehouses.

Cleveland Cap and other firms believe that inventory management, if adopted by enough companies, can bring a new stability to the nation's economy. Improved stock control generally results in more level inventories.

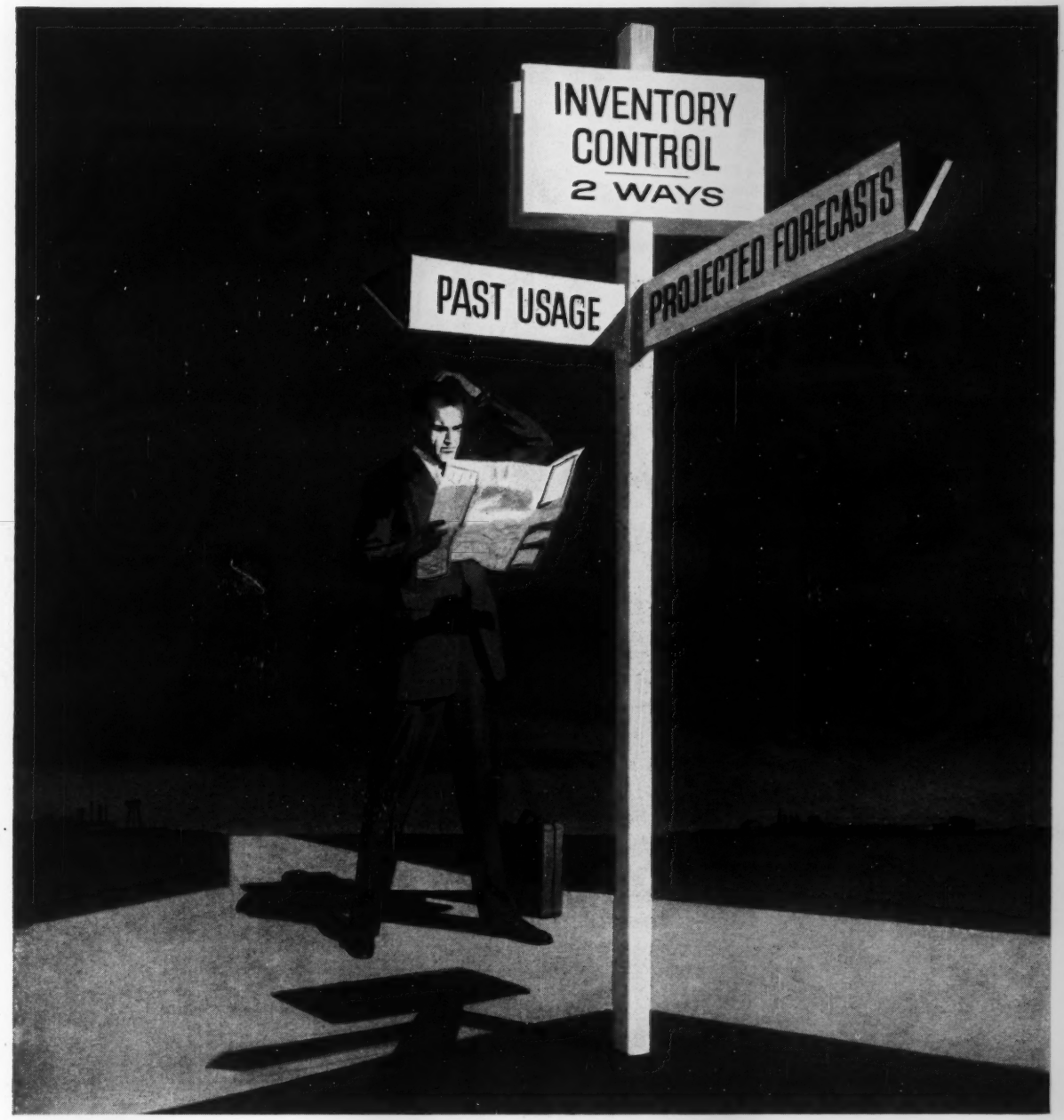
During five business cycles between the two World Wars, average changes in inventory investment were 32.4 per cent as large as changes in gross national product (GNP). During expansions, changes in inventory investment constituted, on the average, 23 per cent of the average GNP rise. During contractions, average declines in inventory constituted 47 per cent of the drop in GNP.

Concludes the National Bureau of Economic Research: "Inventory investment, in terms of violence of fluctuations, is the most volatile of the main components of output."

The relatively new science of inventory research has resulted in many studies of how to curb that violence. Consensus: Improvement will come only if individual companies do the job.

Inventory management looks like the best way to do it.

So, it's up to you.



Which method should this Production Man choose?

Is Hindsight better than Foresight? Sometimes it is – but not in *his* case. Controlling his inventory on the basis of PAST USAGE has led to shortages, overstocks, obsolescence, useless tying up of capital and a lot of other evils of unbalanced inventory.

He's just realizing there's another way – a better way for him – PROJECTED FORECASTS. Sometimes the Hindsight method is better . . . sometimes Foresight is better . . . and this regardless of whether punched-card equipment or a manual system is used.

Are you sure which method is best for your company? Here's an easy way to find out. Turn to pages 6 and 8 of the free booklet "Inventory Control for Manufacturers." You'll get full particulars on both methods. Write Remington Rand, Room 1545, 315 Fourth Avenue, New York 10. Simply ask for KD406.

Remington Rand

DIVISION OF SPERRY RAND CORPORATION

OHIO SEAMLESS TUBING

SPEEDS UP DRILLING 25%

Pennsylvania Drilling Company, Pittsburgh, manufactures drilling equipment for foundation testing, mineral prospecting and other drilling, boring and sampling operations. Recently they introduced a new Flush-Joint Drive Casing made from cold drawn OSTUCO Seamless Steel Tubing.

The new casing stepped up overall drilling progress 25%—driving and pulling is easier and quicker. Flush-Joint Casings are stronger, too—actually 50% less breakage . . . with resultant savings in downtime, repair and material costs. Success with the new casing led to its incorporation in Penndrill's newly-designed Testborer which augers, automatically samples and drives and core drills.

There's a good chance OSTUCO Tubing components can improve the performance of your product. You can start the process by contacting the nearest Ohio Seamless sales office, or by writing direct to the Shelby factory.

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STEEL
May 13, 1957

Technical Outlook

COLORED DIECASTINGS— New applications are in sight for aluminum diecastings made by a cold chamber, vacuum process. Colored or clear anodized finishes are possible due to low silicon content of the alloy that can be used. Nelmor Corp., Cleveland, which developed the process, will start production late this month on license plate frames made from 214 alloy. They will be anodized and dyed gold.

MECHANICAL TRANSLATOR— The University of Michigan reports that its engineers have developed a computer that translates technical Russian into English. Next on the program are several other languages. The university believes that mechanical translations will be a major tool of scientists and engineers in a few years.

HIGH TEMPERATURE RECTIFIER— General Electric Co. researchers have built a silicon carbide rectifier that operates at 1200°F and minus 100°F. Silicon rectifiers have a top limit of about 400°F.

TIN IN TITANIUM— Look for this advance in the near future: Creep resisting titanium alloys made from metal powders containing 3 to 15 per cent tin and small amounts of aluminum. Best application will probably be in small parts, says the Tin Research Institute, Columbus, O.

EXOTHERMIC FERROMANGANESE— Called Martemp, it improves manganese recovery and minimizes segregation when used for ladle additions of 1 to 2 per cent manganese for open hearth heats, reports Electro Metallurgical Co., a division of Union Carbide Corp., New York. In open hearth tests with steels containing 1 to 1.9 manganese, recovery was 10 to 15 per cent higher—compared with practices in which most of the manganese is added to the furnace. The company says its additive also gives more consistent recovery of aluminum in fine grained steel. Another advantage: Heat losses from ladle addition are reduced, so all manganese for medium manganese grade steel may be added to the ladle without chilling.

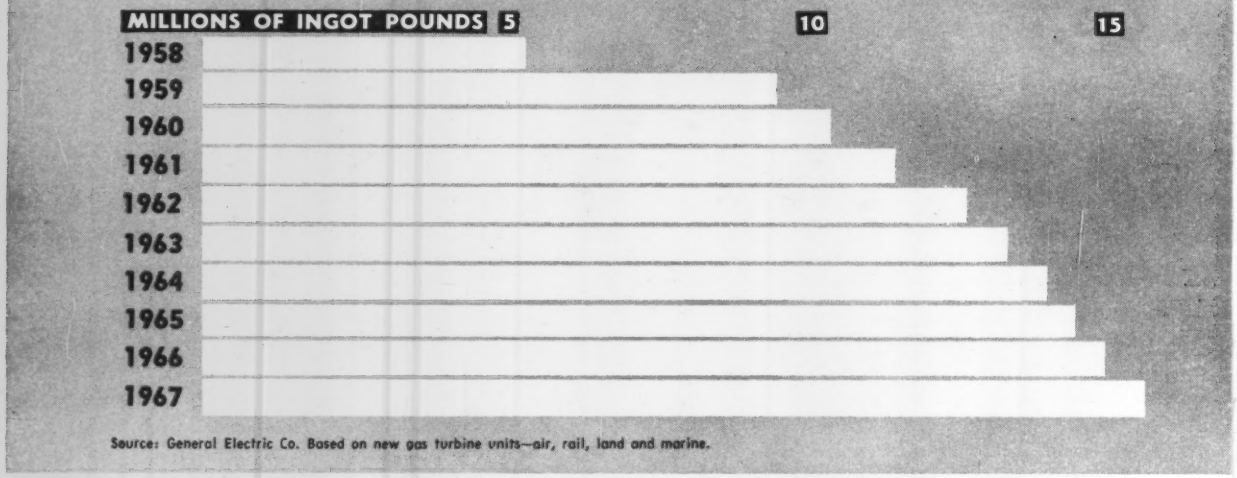
DEPENDABLE LIGHT— The Air Materiel Command has developed a light that burns for five years and never fails. The source is a small piece of strontium-90 in a special treated metal which is sealed in a transparent plastic button. It will be used to illuminate entrance and escape hatch door handles on long range jet bombers.

CAPSCREW PROGRESS— Being assembled at Cleveland Cap Screw Co.'s new Cleveland plant is one of the biggest cold heading machines ever made: A 1¼-in. Boltmaker. Its first job: 1¼-in. capscrews. Production of cold-formed specials will come later.

MORE VACUUM METALS— Fabricators are finding more uses for vacuum melted metals, and producers are preparing to take care of them. Allegheny Ludlum Steel Corp. announces it will be making 2 million lb a month of vacuum melted superalloys by June. (It started production with a monthly capacity of 250,000 lb in October, 1955.) Crucible Steel Co. of America is doubling its capacity at Vacuum Metals Corp., a division of its Sanderson-Halcomb Works at Syracuse, N.Y. Included will be a vacuum induction furnace to produce 3000-lb ingots.

Metalworking Outlook—p. 63 *Market Outlook—p. 189*

Here's how demand will rise for nickel and cobalt base alloys which have an operating range of 1400 to 1700°F. As new materials go beyond this range, turbine temperatures will go up. These alloys will be used in "cooler" parts of the system



Source: General Electric Co. Based on new gas turbine units—air, rail, land and marine.

Today's Hottest Question: Materials for

THE NEED arises primarily from the requirements of gas turbines, nuclear power plants, rockets and long range guided missiles. The critical range is above 1500°F and may extend to 5000°F, reported engineers at a high temperature materials conference sponsored by the Cleveland section, AIME, week before last.

Although the temperature in jet engine blades is below 2000°F, high stresses, long operating times and critical dimensions make this application difficult to satisfy. One of the highlights of the meeting was an account of research done at GE's Aircraft Gas Turbine Division, Evendale, O. A cobalt base alloy was modified to give the ductility needed in turbine buckets at 1700°F. R. F. Morris reported that 0.4 per cent boron and 0.2 per cent carbon were used. The new alloy is called ML-1700.

Modification—Boron has an important part in giving another alloy better hot strength. J. T. Brown, Westinghouse Electric Corp., Pittsburgh, reported that a modified Discaloy, called W545, gets its improved stress rupture strength from small amounts of boron (0.005 to 0.2 per cent). Titanium with boron additions is also effective.

Mr. Brown said that W545 is being made in commercial ingots and is ready to take on jobs where more strength at higher temperature is needed.

In turbine disc applications, it will perform at a temperature 100°F higher than regular Discaloy, or it will give 25 per cent more strength at the same temperature, which means a significant weight reduction.

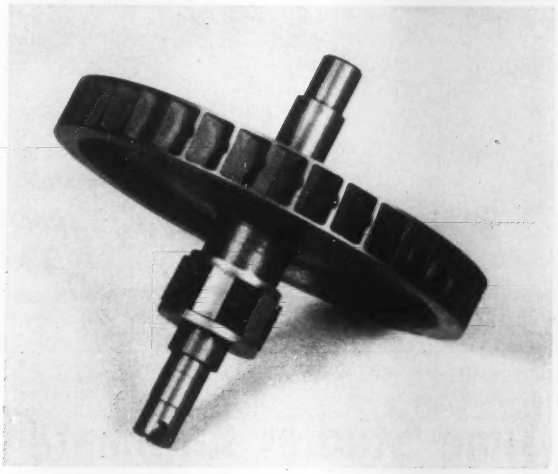
Bright Future — F. L. Ver Snyder, General Electric Co., Schenectady, N. Y., predicted that nickel base alloys would continue to carry a large share of the load in the 1400 to 1700°F range. One reason: Vacuum melting permits the use of titanium and aluminum as alloying elements, giving materials such as M-252 and Udimet 500 improved strength-temperature properties.

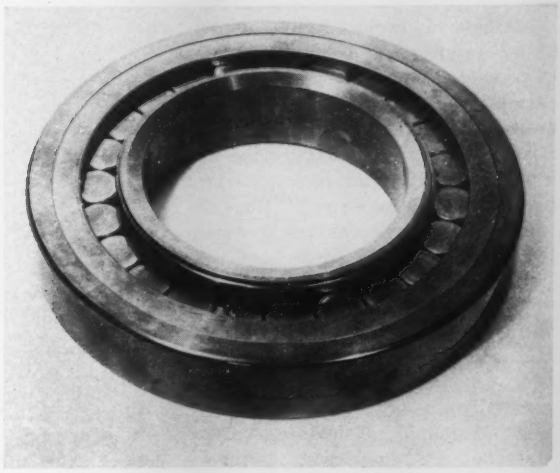
Identification of the Ni_3Al compound as the phase most responsible for the useful properties of nickel base, high temperature alloys, such as GE's M-252, is a big step forward, he said. Eventually, it may mean that fewer alloying elements will be used.

He predicted that as we better understand the principles we may not need to use seven or eight alloying elements as we do now. Alloys will be cheaper, simpler.

Cobalt Family—Alloys in this group perform well in the 1600 to 1700°F range. Chromium is added to cobalt for oxidation resistance, tungsten and/or molybdenum to give hardness for more abrasion resistance and to increase high temperature strength. Typical of widely used alloys are S-816, Vitallium, Haynes alloys Nos. 21 and 25 (L-605) and Stellite.

PROGRESS IN CERMETS — Complex turbine wheel (left) made from metal bonded titanium carbide (Kentanium grade K164B), showing thin sections and deep pockets formed prior to sintering. At right is antifriction bearing made of grade K163B1 for unlubricated service at 1500°F





Photos courtesy of Kennametal Inc., Latrobe, Pa.

Use Above 1500°F?

An outstanding property of cobalt base, high temperature alloys is their ability to resist carburization, it was pointed out by Glenn Fritzlen, Haynes Stellite Co., a division of Union Carbide Corp., Kokomo, Ind.

Another point in their favor brought out by Mr. Fritzlen is that they do not necessarily require vacuum melting or heat treating to provide required properties. But vacuum melting may point the way for new alloys.

Recent tests have shown that cold work and aging increase the elevated temperature strength of Haynes No. 25 bar specimens. He predicted that further studies along this line may open up new possibilities.

Due to Grow—There seems to be little doubt that vacuum melting will play a bigger future role in helping metallurgists get the last bit of hot strength out of the nickel and cobalt base alloys.

P. W. Beamer, Austenal Laboratories Inc., New York, told about tests to develop vacuum investment casting of Waspaloy, Udimet 500 and Inco 713. The most economical way, he said, is to use vacuum melted heats of master alloys rather than alloy and refine small separate heats.

Mr. Beamer outlined a typical cycle for a 50-lb melting furnace:

1. Metal from the master heat, obtained from a reliable source, is charged into the crucible.

2. The hot investment mold is inserted into the chamber. During the melting and casting period, the mold cavity drops only 200 to 275°F—not enough to be serious.

3. The chamber is evacuated. When a pressure of 5 microns of mercury is reached, power is turned on and melting starts. A pressure of 2 to 4 microns is generally obtained during the melting and casting cycle.

4. After the charge is melted, a measurement is taken on the gas evolution rate within the furnace. This is a check on quality of the alloy being processed and also determines the length of the refining period before casting.

5. When ready to cast, the thermocouple is removed, and pouring is completed in 8 to 10 seconds.

6. The mold is cooled under vacuum to a temperature below the level at which intergranular attack or oxidation of the metal surface might take place.

7. Air is bled into the chamber, then the tank is opened and the mold removed.

Vacuum Vs. Inert—"It has been our experience," reported Mr. Beamer, "that a more consistent high level of properties is obtained with vacuum than with argon or some other inert atmosphere. Vacuum casting provides an oxygen-free environment which cannot be guaranteed by inert atmosphere on a production process."

Mr. Beamer noted that there are modifications of the basic compositions and techniques of the three alloys studied which will give the design engineer investment cast parts with 1800°F stress rupture properties similar to these alloys at 1700°F.

The outlook is also promising for the development of forged vacuum melted nickel and cobalt base alloys which will have a 100-hour

MATERIALS ABOVE 1500°F . . .

rupture life of about 25,000 psi at temperatures approaching 1800°F.

Ceiling—But this looks like about the top for the conventional high temperature alloy systems.

Increases in service temperatures of jet engines will require the use of refractory metal base alloys and cermets. Even so, the over-all increase in engine temperature will require nickel and cobalt base alloys as turbine and perhaps compressor wheel material. Rockets and missiles will find many uses for these alloys in sheet form.

In the cermet area, the possible combinations of metals and ceramics are tremendous. Right now the metal bonded titanium carbide base alloys (Kentanium) are out in front.

J. Wambold, Kennametal Inc., Latrobe, Pa., reviewed progress with this material. For example, composition K183A has a fourfold increase in stress rupture strength at 1800°F over some of the earlier products. Newer compositions also show better ductility.

Molybdenum—In applications of refractory metals for the 1800 to 2000°F range, molybdenum is far advanced over chromium base alloys. Work with chromium metals is still largely confined to the exploration of alloy systems. Molybdenum has reached the engine test stage.

The only real deterrent to more extensive use of molybdenum is the lack of a reliable coating to prevent high temperature oxidation.

Requirements are stiff, says Julius Harwood, Office of Naval Research. The coated blade must resist oxidation for hundreds of hours at high temperature. It must resist many cycles of rapid heating and cooling in an air blast. It must resist fracture of the coating under impact of a foreign object.

One of the most promising coatings for use up to 2000°F is chromium plate 1 mil thick followed by nickel plate 5 to 10 mils thick. Nickel base alloy cladding also looks good, and it's used for molybdenum parts being engine tested.

• *An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, O.*

Automatic machine cycle is analyzed by comparing operation with master coded chart of an optimum cycle. Chart deviations show necessary adjustments

Sequence-Time Studies Automated

AUTOMATED production lines and automatic cycling machinery are putting the human eye and stop watch out of the time study and methods analysis business.

The older procedures are not fast enough nor accurate enough to develop adequate time-study information on high speed operations. Also, many events in a machine cycle involve electrical, hydraulic or pneumatic operations which are not visible for timing.

New tools and methods are needed for the "debugging" of new equipment and for maintaining it after it is set up.

Recorder—One such tool is the Monitorecord sequence-time recorder developed by Sheffield Corp., Dayton, O. It was described by Kirk E. Birrell, project engineer of Sheffield's Autometrology Division, at the 21st Annual Machine Tool Electrification Forum sponsored by Westinghouse Electric Corp. at Buffalo.

The machine is a portable, 14-channel time recorder in which a 5-in. strip of pressure-sensitive paper is driven by a synchronous motor under a bank of 14 electrically actuated styluses.

Operation—Data are obtained by making electrical connections to terminals in the control panel of the machine being monitored. Terminals are selected which give sequence start-and-stop times when energized or de-energized.

Connecting the terminals through a receptacle to the sequence-time recorder in chronological sequence makes possible a bar-chart "picture" of the simultaneous and/or sequential operations with an accuracy of 0.01 second.

Case History—The purchaser of an automatic transfer-type gage had been promised a production rate of 1800 pieces an hour. The best efforts of experienced toolmakers failed to produce over 1500.

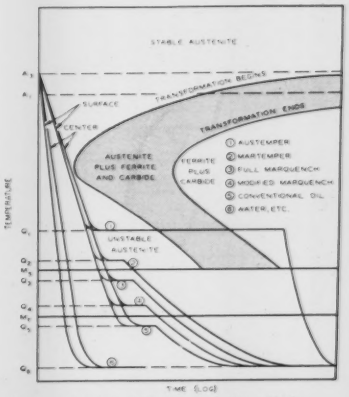
Analysis of a time chart made by the Monitorecord pinpointed adjustments which, when made, allowed the required number to be gaged.

Maintaining Rates—Complex machine tools get out of adjustment sometimes. Solenoid valves become plugged, cylinders wear in, flow valves plug or vibrate loose, timers and relays stick.

By taking routine time-data charts and comparing them with a master coded chart (perhaps as a clear plastic overlay) which represents an optimum cycle, the causes of out-of-adjustments are easily found.

Here are the quenching treatments, media and temperatures in common use. "Q" numbers refer to the graph (right)

Quenching Treatment	Temperatures Ranges (°F)	Quenching Media	Refer to Illustration
Austempering	600 - 900	Molten salt Molten metal	Q1
Martempering	400 - 700	Molten salt	Q2
Full marquenching	325 - 450	Molten salt Oil	Q3
Modified marquenching	200 - 350	Oil	Q4
Conventional oil	100 - 170	Oil	Q5
Water	60 - 100	Water, brine, caustic, etc.	Q6



Source: Sinclair Refining Co., New York.

Here are some hypothetical cooling curves for several heat treatments showing their relationship to the quenched properties of a steel with known transition curves

Choosing the Right Quench

To get the most from modern heat treatment, you must combine economy, minimum distortion and favorable cooling characteristics. Proper equipment is also essential

By O. E. CULLEN
Chief Metallurgist
Surface Combustion Corp.
Toledo, O.

QUENCHING must do more than harden steel.

The technique you select must also give the product maximum fatigue life and a high stress analysis. You must achieve these results with a minimum of presses, fixtures and plugs—too many make a job unprofitable.

Here are the benefits you can expect from proper quenching:

1. A uniform hardness pattern.
2. Small dimensional changes.
3. Elimination of quenching cracks.
4. Elimination of undesirable transformation structures.
5. Longer service from the quenching medium.

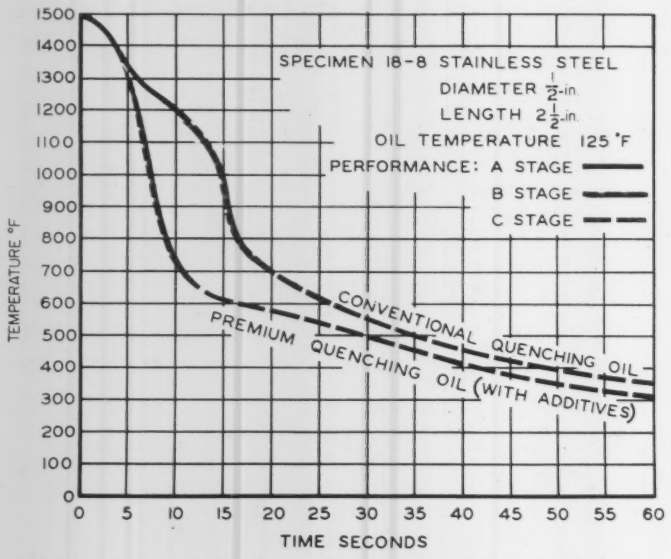
Media—Selecting a basic quenching medium depends on the temperature at which it is used.

The accompanying table (top of page) lists widely known quenching treatments and the media which are suitable in various temperature ranges. The development and understanding of TTT curves aid the choice of quenching medium.

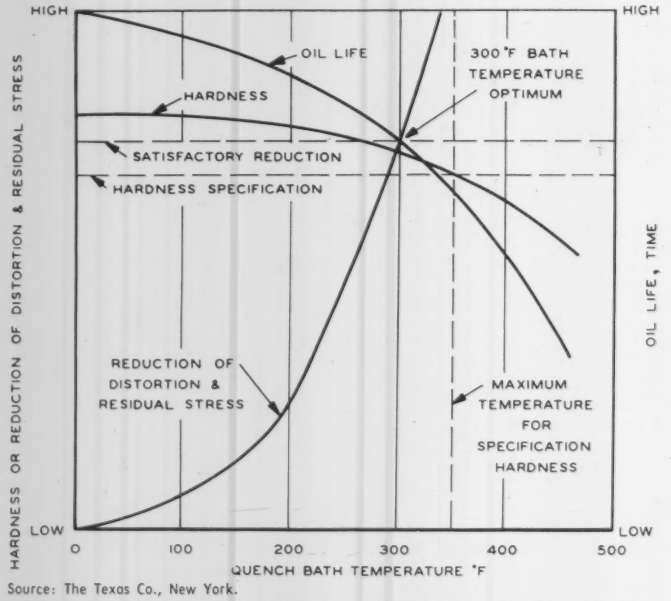
The graph on this page illustrates characteristic cooling curves for several treatments and their relationship to the quenched properties of a steel with known transition curves. (Check table.)

Improvements—There has been recent emphasis on technique improvements in the temperature range of conventional oil quenching and marquenching—from about 100 to 450°F. Optimum hardness of most heat treatable steels, particularly case-hardened types, can be developed in that range.

Conventional oil is still the most popular medium in the group. Most major quench oil suppliers have made extensive studies to develop better cooling characteristics, longer useful oil life and cleaner work. Users gain one or more of these



The two curves will give you an idea of the effects of additives in premium quenching oil. Consider them in making a cost analysis and comparing results with those of ordinary oils



Source: The Texas Co., New York.

To find the right marquenching process, make a graph like this one. Best results are obtained at the point of intersection

benefits: Improvement in quality of the initial product, compatible additives and more complete information about the care of the oil.

Wetting Effect — Improvements due to additives are attributed to the better wetting power of the treated oil in the early or high-temperature stages of quenching where vapor phase is most often encountered. Typical cooling curves (above) are shown for identical specimens quenched in conventional oil, and in an oil of equivalent quality which contains suitable additives to improve cooling characteristics.

When either conventional oils or those with additives are used, the recommended range for optimum quenching and good oil life is between 120 and 170°F. Below 120°F, many oils show low cooling power due to high viscosity; above 170°F the quenching rate is said to show little improvement, but the quality and life of the oil are rapidly reduced.

There is growing interest in quenching close to the upper limits of the recommended range. The practice shows ample evidence of benefits from minimized distortion and improved cleanliness of the work.

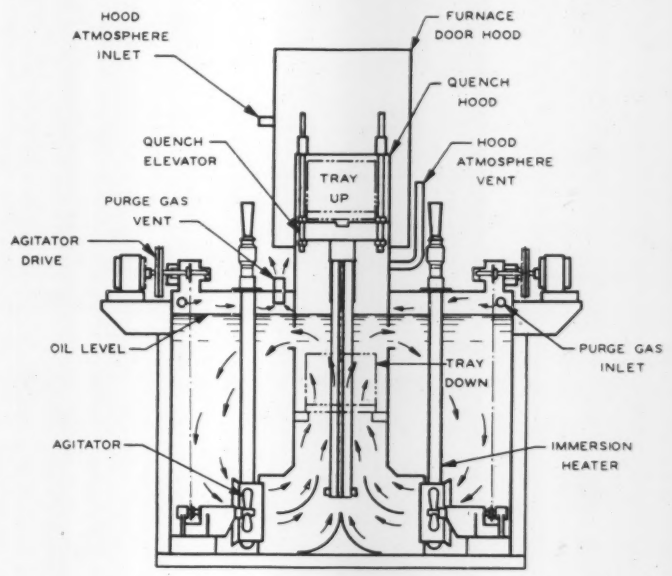
Filtering and control of water content by centrifuging are recommended.

Hot Oil or Salt—Marquenching is an inaccurate term popularly used to describe quenching treatments in media which are hotter than oils in conventional quenching but less than 450°F. Temperatures between 200 and 325°F are used in modified marquenching. The full marquenching range is from 325 to 450°F.

The choice of oil or molten salt as the quenching medium depends on adaptability to the needs of the user. Quenching above 400°F is almost exclusively confined to salt because of the short life of present oils at such temperatures. Below 350°F, the reverse is true because of the poor fluidity of salt mixtures. Between 350 and 400°F, quality characteristics of steels are comparable when quenched in either medium.

Defined—Marquenching is used to quench steels from austenitizing temperatures in a bath at 200 to 450°F. As soon as the steel is at bath temperature throughout, it is removed and cooled in air to room temperature. Elevated quenching temperatures minimize dimensional changes.

In full marquenching, martensitic transformation occurs uniformly throughout the part at a rate slow enough to eliminate distortion or cracking. The reason: Air cooling through substantially the entire (M_s-M_f) transformation range.



This is a cross section of a well designed quench tank. Note the agitators and baffles which improve the flow of oil around parts

Distortion and Growth of Heat Treated Parts

You can expect these results in a batch furnace on a production basis. Note the better distortion characteristics of marquenching

GEARS—4 to 9.5 in. pitch diameter (Marquenched)

Involute error (max)	plus or minus 0.0003 in.
Total tooth spacing error (max)	0.0005 in.
Bore shrinkage	0.0005 to 0.0010 in.
Lead error (max)	plus or minus 0.0003 in.

SHIFTER RAILS—1 in. diameter, 1141 steel, neutral atmosphere

	Standard (Oil to 140°F)	Marquench (Oil at 300°F)
10 in. long—camber	0.012 to 0.016 in.	0.003 in. max
14 in. long—camber	0.018 to 0.026 in.	0.005 in. max

COUPLINGS—2¾ x 1 9/16-in. OD x 0.750-in. ID 1025 steel

	Standard	Marquench
ID growth	0.006 to 0.009 in.	ID shrink 0.001 to 0.002 in.
Out of round	0.003 to 0.005 in.	0.0005 in.

In conventional quenching, temperatures from core to surface and throughout nonuniform cross sections are not equalized during cooling through the transformation range. Nonuniform transformation results in high, nonuniform stresses or cracking.

You can get the full benefits from this process only when you use steels of proper analysis. You should use modified marquenching when treating steels with critical cooling rates which require faster quenching than can be obtained by full marquenching. You may also use modified marquenching when the end product is acceptable with some distortion or stresses accompanying high hardness.

In selecting the correct marquenching process, consider these:

1. Critical cooling rate determined from the transformation diagram (TTT curve) of the steel.
2. Size and shape of workpiece.
3. Allowable distortion.
4. Hardness and other mechanical properties.
5. Life of quenching medium.

The illustration (page 124) shows a method which is useful in selecting the most suitable marquenching process.

Tray Loading—While the selection of the best quenching medium is of primary importance, remember that most work is conveyed from a heat treating furnace into a quench tank in a tray or container. Care in loading for uniform contact with the quenching medium will minimize dimensional changes caused by slight nonuniform cooling and transformation rates.

There are many solutions to correct fixturing; often the choice is determined by experimentation. Workpieces of nonuniform cross section often exhibit final dimensional changes during quenching which are inherent because of their size or shape. Allowances should be made for such changes when you machine the part.

Quench Tank—In modern heat treating practice, the quench tank is an important part of the process. Since quenching becomes an integral part of a fully mechanized or automatic cycle of heat treatment, the design of the quench tank and its auxiliary equipment is just as critical as any other item.

The quench tank must be suf-

ficiently large to insure proper temperature control. The quenchant must be agitated to provide correct cooling rates for the work. Guides for the agitated quenchant insure uniform cooling.

In most modern heat treating processes, workpieces are quenched directly from atmosphere furnaces without air contact. Hooded vestibules are used for the transfer. The work and tray move from the heat treating furnace into the quench vestibule. An elevator lowers them into the quenching medium.

In equipment of that type, the quenching medium is usually oil in the conventional or marquenching temperature ranges. Agitators move the oil through baffles and the work enclosure to insure uniform flow. In some instances, the direction is reversed. The most suitable direction is often a matter of experimentation — it can be changed to meet the requirements of the work.

Quenching tanks of this type are especially good with full marquenching processes. The high temperature of the oil requires that it be protected from the air to cut down oxidation and increase oil life. Often, the oil is either protected by a top blanket of inert gas or maintained at a level high enough to fill the tank and extend up into the chute or throat connecting the vestibule with the tank.

The quench oil can be heated or cooled by outside equipment. In marquenching, it is done in the quench tank.

The accompanying table (page 125) shows a laboratory report of results obtained with a batch furnace on a production basis. The distortion in two methods of oil quenching—conventional and marquenching—is compared.

Advances in quenching techniques have contributed much to the over-all improvements in heat treating practices. Future work should include the development of more favorable cooling characteristics. More benefits from low alloy steels will result. Ultrasonic quenching is also being investigated.

• *An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, O.*

	Room Temperature	Room Temperature Properties After Soaking 100 Hr at 900°F	900°F
Ultimate tensile strength (psi min)	220,000	220,000	170,000
Yield (0.2% offset) (psi min)	185,000	185,000	140,000
Reduction of area (% min)	35	35	50
Shear (psi min)	140,000	140,000	100,000
Stress rupture (psi for 100 hr life)			130,000
Fatigue strength (psi at 8 million cycles, 10% preload)	80,000	55,000	80,000
Impact strength (ft-lb)	18	18	23

These physical properties show that . . .

This Bolt Takes the Heat

PROOF that hot work die steels are solving some problems of ultrasonic flight: A new aircraft bolt, Hi Tm 9, just announced by Standard Pressed Steel Co., Jenkintown, Pa. (See "Exploring the Thermal Barrier," STEEL, Mar. 11, p. 157.)

Made from a modified hot work die steel called Vascojet 1000 (Vanadium Alloys Steel Co., Latrobe, Pa.), the fasteners are said to have these advantages:

- High static and fatigue strength at 900°F.
- Long stress-rupture life.
- Stability after long exposure to high temperatures.
- Resistance to oxidation and corrosion.
- High strength-to-weight ratio.

Solution — Although the first bolts are for tension applications, SPS says it will make them for shear and various special purposes. Applications: Aircraft engines, airframes, power plant turbines, nuclear vessels and equipment used in high temperature and pressure chemical processes.

Methods—SPS says that threads are cold formed after heat treatment.

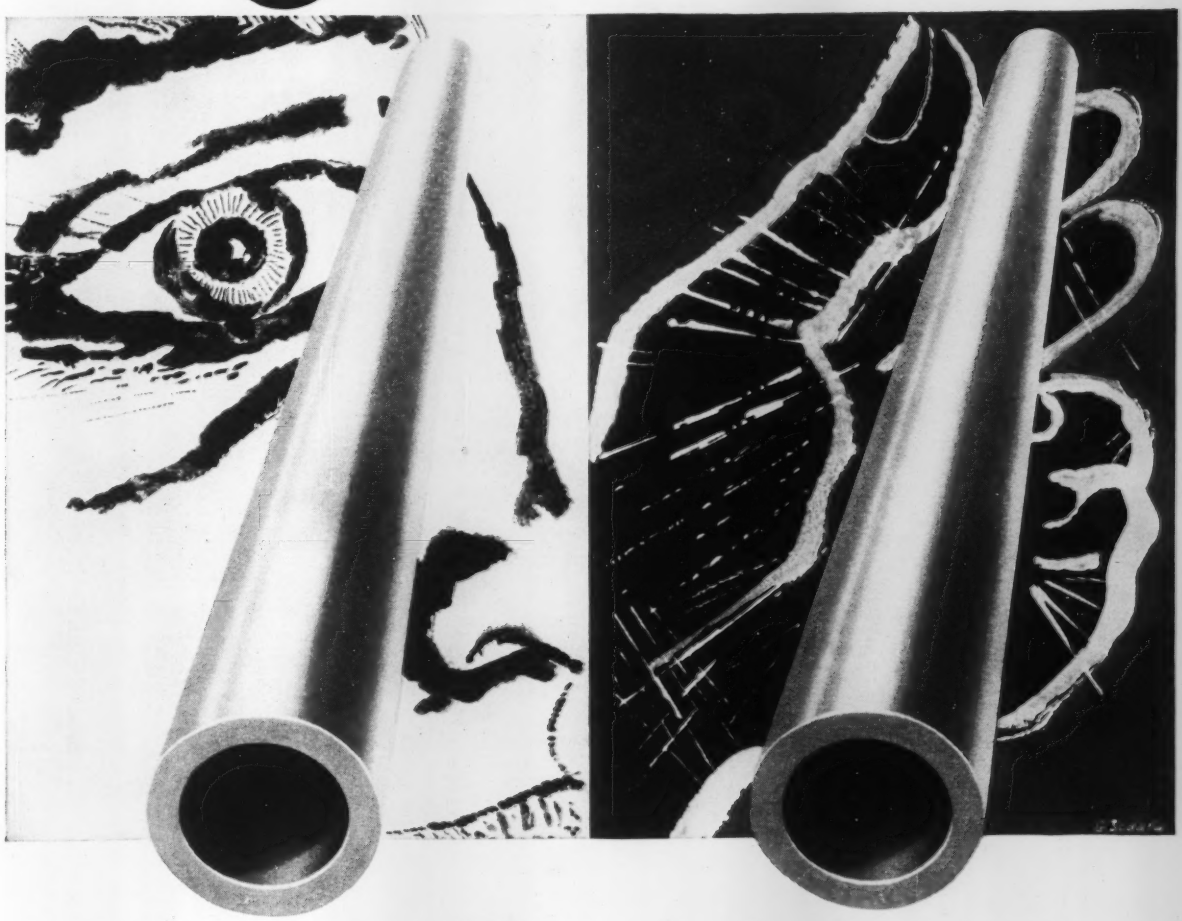
Bolts are plated with diffused nickel-cadmium for corrosion resistance. Cadmium alone isn't successful because it melts just over 600°F and diffuses into the basis metal causing embrittlement. The electroplates are applied in separate layers; heat treatment forms an alloy that is good up to 1000°F.

Bolt threads have an unusually large root radius which improves fatigue strength and stress rupture life.

The firm says that the physical properties of Hi Tm bolts at 900°F are considerably better than those of military standard MS-20004 bolts at room temperature.

Hi Tm may be the key to many structural design problems in Mach 3 to 4 flight; some missiles already operate in the 2100 mph range.

USCOLITE PLASTIC PIPE



Look alike . . . Feel alike

BUT AS DIFFERENT AS DAY AND NIGHT

It's a fact: Given the same raw materials, finished plastic pipe can be as different as day and night. The difference is in the techniques of compounding and manufacture.

For instance, these two lengths of plastic pipe, when new, have the same appearance, the same "feel", even the same weight. Both are used to carry the same corrosive chemicals. Yet one pipe failed in just a few months—the other pipe still shows no sign of wear after several years of service.

What's the difference? The *long-life* plastic pipe (on the right) is Uscolite®, and that means *quality*—the use of undiluted virgin resins, superior extrusion techniques, precision dimensions, quality control all the way.

When you order Uscolite—either Uscolite CP (modified alloy) or Uscolite RV (polyvinyl chloride)—you're getting plastic pipe with a reputation that has been proven by 8 years of service. And in all that time, *not one foot of Uscolite Pipe has ever been replaced.*

For your next plastic pipe and fitting installation, select carefully—select Uscolite. A complete line of pipe and fittings (including unique UscoWeld® fittings) plus the assistance of trained sales engineers who *know plastics*—is available at the 28 "U. S." District Sales Offices, at selected distributors, or contact us at Rockefeller Center, New York 20, N. Y. In Canada, Dominion Rubber Co., Ltd.

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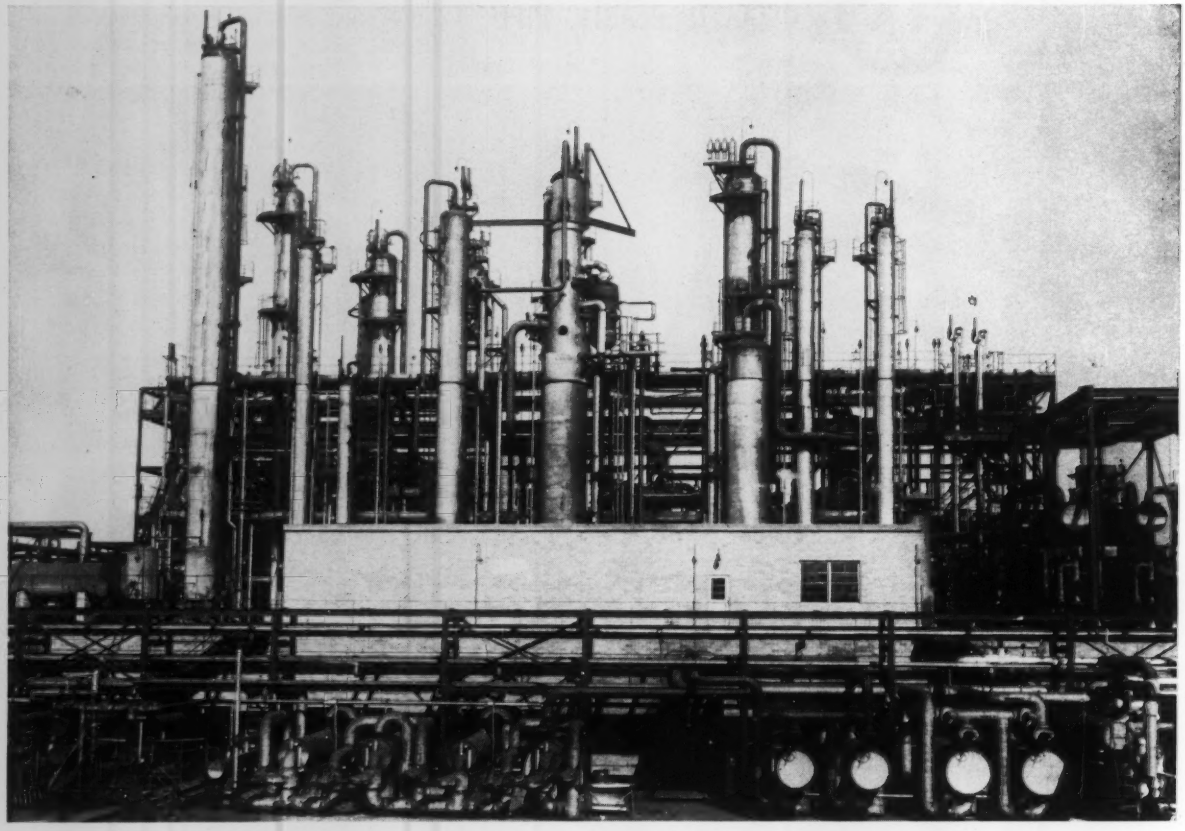

Chemicals from the Steel Plant

Recovery plants are seeking to strengthen the position of coal chemicals with upgraded coke oven by-products. Pickle liquor recovery means savings

ORGANIC chemistry textbooks used to feature a drawing of a tree. From its coke oven roots sprang a host of products: Dyes, plastics, fibers, drugs, insecticides, coatings.

That picture has changed. Although the demand for coke oven by-products is still strong, petroleum base chemicals are serious competitors. The pressure is on the coke plants to turn out better products.

Upgrade — One answer to the challenge can be seen at Clairton, Pa., where Koppers Co. Inc., Pittsburgh, is building a plant to refine light oil for U.S. Steel Corp. This oil contains benzene, toluene, xylene and a small percentage of impurities. The forward-looking project anticipates the day buyers will demand improved coal chemicals.

"Today's benzene contains 200 to 500 ppm of thiophenes; tomorrow's product will contain less than 1 ppm. Today, xylene has a maximum of 4 per cent paraffin volume; in the future it will be less than 0.5 per cent," say Koppers engineers.

They point out that some chemical processes using benzene, toluene and xylene as raw materials are greatly improved when ultrapure products are used. Some chemical reactions would not be commercially feasible unless high-purity

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Proof of the scope and versatility of our engineering services moves across our shipping floor daily. There you will see an astounding variety of primary and auxiliary rolling mill equipment, and specially engineered machinery of every description.

But it is not design experience, alone, that makes our engineering outstanding. Equally important are our extensive and varied foundry and machining facilities which give our engineering staff unlimited freedom in designing for production.

We call this perfect coordination of design and production "engineering experience *in action.*" The result is efficient, practical, cost-saving equipment for your plant.

LEFT FOREGROUND — Conveyor table for rod or tube.

Hot Strip Mill Finishing train designed and built for Detroit Steel Corporation

Pittsburgh ENGINEERING & MACHINE CO.

Division of Pittsburgh Steel Foundry Corporation

P. O. BOX 986, PITTSBURGH 30, PENNSYLVANIA

PLANT AT GLASSPORT, PENNSYLVANIA

"Steel castings including alloys from 1 lb. to 100 tons"

benzene, toluene and xylene were available.

Cutting Costs — At Blaw-Knox Co., Pittsburgh, Chemical Plants Division personnel declare: "Steelmakers have more incentive than ever before to get the last squeal out of the pig. Now everyone realizes that natural resources are not unlimited. By economical use of by-products, steelmakers can achieve lower cost per ton of steel."

Researchers at Bethlehem Steel Co., Bethlehem, Pa., agree that: "Coal chemicals have developed as an important contributing factor in the over-all sales picture of an integrated steel operation. We recover valuable chemicals which would be, in some cases, lost entirely and in others, recovered only at fuel values."

Full Use—As labor and material costs spiral upward, a good possibility for recouping losses is optimum utilization of crude tar, carbolic oil, crude naphthalene, benzene, toluene, xylene, ammonium sulphate and residual oils. To get best use of these by-products, steelmakers are having to become better chemists.

Koppers, well aware of the situation, is building a "semiworks plant"—one step beyond a pilot plant—at Arroyo, W. Va. One of its purposes will be to separate phenantherene from coal tar to such a purity that commercial uses can be provided for it. Phenantherene is regarded as the most common hydrocarbon for which no use has been found.

Scrubbers — Getting the last ounce of value out of coke oven gas is the purpose of a spray-type gas scrubber recently installed at Crucible Steel Co. of America, Midland, Pa. Rust Engineering Co., Pittsburgh, designed the low-cost installation to go into a shell that formerly housed a packing-type scrubber.

Packing was removed, and spray headers, collecting trays and pumps built into the old shell. Rich gas enters the scrubber from the bottom and flows upward through gas deflectors. Lean wash oil enters at the top and flows downward from tray to tray, emerging at the bottom as rich wash oil.

The tower is handling all coke oven gas produced at the rate of 37.5 million cu ft per day, an increase of 14 per cent over former two-tower capacity. Light oil recovery is about 90 per cent.

Ammonia — Columbia - Geneva Steel Division, U.S. Steel Corp., is building an $18-million ammonia and nitrogen compound plant at Geneva, Utah. It will use raw coke oven gas as the source of hydrogen for ammonia synthesis.

Columbia-Geneva officials expect it to start a new trend in coal chemicals recovery. Blaw-Knox, the contractor for design and construction, estimates that the cost of making ammonia by this by-product method is 10 to 15 per cent lower than that of other methods.

Mixture—Hydrogen will be supplied by gases from the plant's 252 coke ovens. Nitrogen from the air (it could be waste nitrogen from an oxygen plant) will combine with hydrogen to make anhydrous ammonia. Columbia-Geneva will manufacture two grades of nitric acid. Markets for concentrated acid include producers and refiners of metals and makers of explosives. Lower strength acid will be used in the manufacture of ammonium nitrate—a high-strength fertilizer.

Since hydrogen has a relatively low heat value, the product extracted from coke oven gas will have a much greater value in the production of chemicals than it had as fuel. The $18-million investment shows how seriously steelmakers are searching for profits in by-products.

Dr. Joseph H. Wells, chief research engineer, coal chemicals, at U.S. Steel's research center in Monroeville, Pa., says that about 2000 chemicals have been identified in gases driven off as coal is transformed into coke. Of these, only about 50 are being recovered and used. Some of the others hold great promise, he feels, and researchers are studying this great untapped reservoir.

Pickle Liquor—Another untapped reservoir at the steel plant is waste pickle liquor, a costly nuisance. Steelmakers may be nearing the end of their long search for ways to dispose of it cheaply, preferably at a profit.

Blaw-Knox officials report satisfactory operation of the pilot plant at Niles, O., which regenerates waste pickle liquor by a modified Ruthner process. The entire sulphate equivalent is recovered as re-usable sulphuric acid. The only by-product obtained is iron oxide, which, when sintered, can be recharged to the blast furnace. Eight steelmakers and Blaw-Knox sponsor the $500,000 pilot plant which began operation in September, 1956.

Zahn Method—A recent entry in pickle liquor regeneration is a method developed by Zahn & Co., a German engineering firm. Blaw-Knox Co. will market the Zahn

What do you want from by-product recovery equipment?

THROUGH its Market Research Department, STEEL conducted a survey of 24 coke plants. Of this number, 22 operate 54 by-product recovery units. Over the next two years, five plants plan to replace coke ovens or construct new ones; three to replace or enlarge recovery units. Here's what they look for in new by-product recovery equipment:

"More efficient washing of gases."

"Low differential saturators. Control of ammonium sulphate crystals. Light oil scrubbers with improved back pressure, cleaning and efficiency."

"Cheapness of investment because present value of by-products does not allow a normal return on investment."

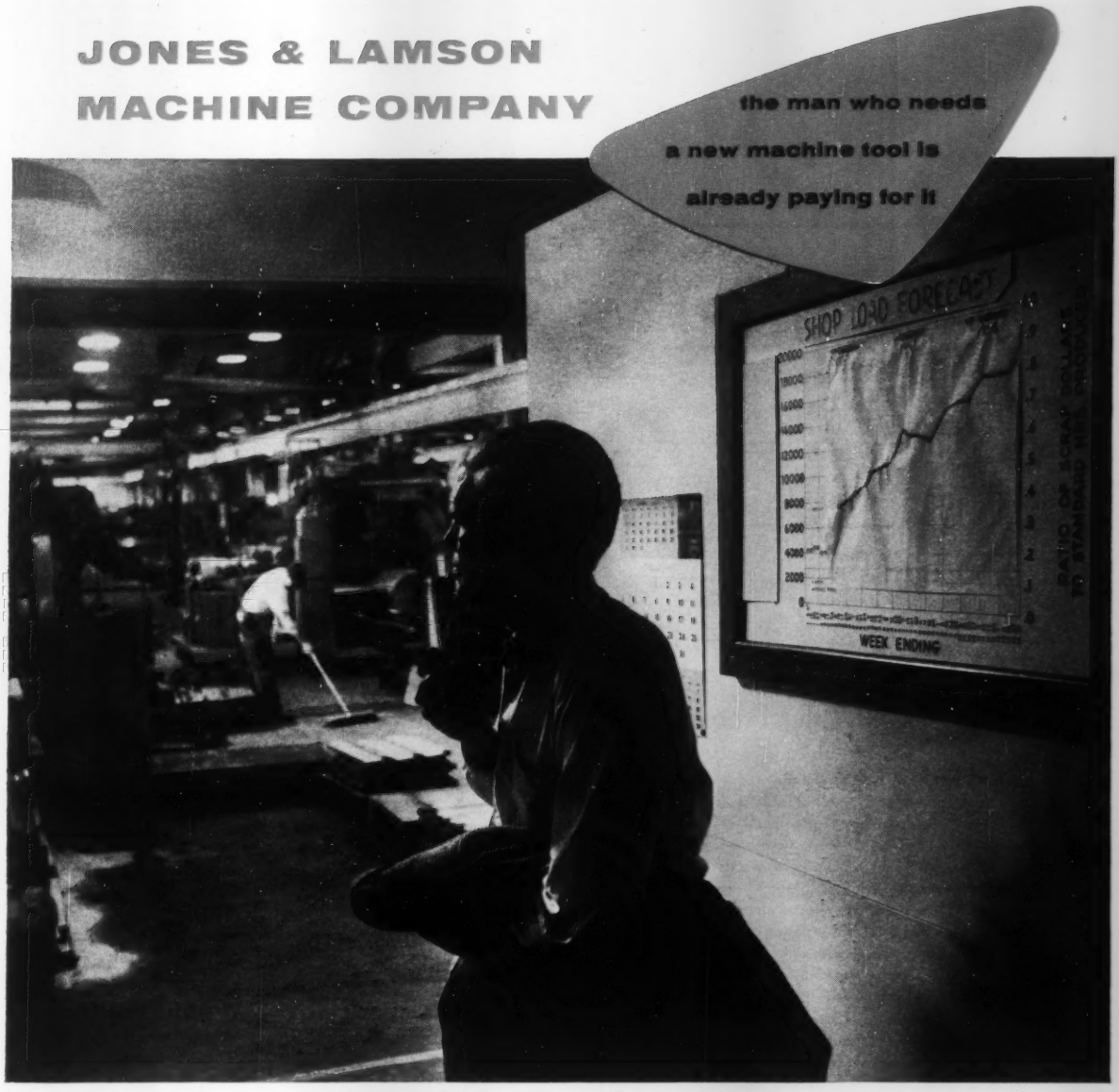
"Thiophene and paraffin-free products."

"Recovery of ammonia in the form of ammonium phosphate. Removal of carbon dioxide from blast furnace gas."

"Tar dehydration. Elimination of odor in some light oil fractions. Thiophene-free benzol."

"Safety, low maintenance, efficiency, high quality."

JONES & LAMSON MACHINE COMPANY



There's no time like the future

There just isn't any way of predicting the "when" or "whence" of future orders. Things happen fast nowadays, and twists of fortune can transmute production dreams into nightmares in a twinkling.

There's one thing sure about the future, though, and we can all bank on it: tomorrow, next year and ten years from now, the competitive edge will be held by those who are equipped to turn out the best possible products at lowest possible cost.

The most advanced machine tools and methods are nothing less than *a vital requisite of survival*. Good sense, therefore, dictates that you keep abreast of the latest developments in production.

We'd like to help you do just that. Liberal finance plans are available.

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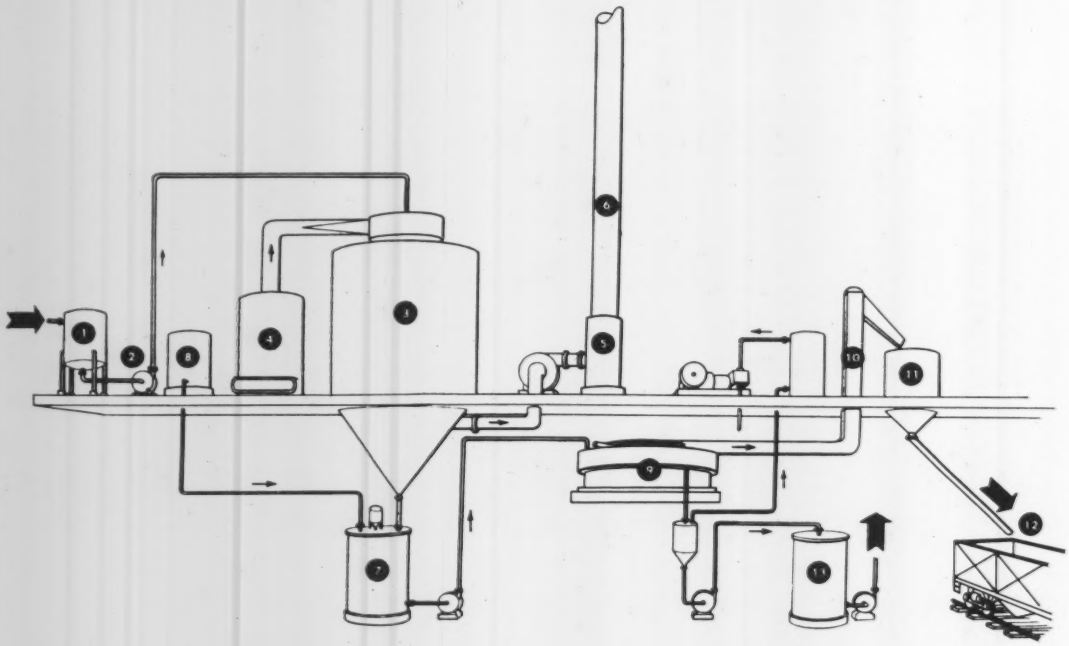


Zahn Process for Pickle Liquor Regeneration

Here's how the Zahn (Koppers) monohydrate process works: Pickle liquor direct from the baths or holding tanks (1) is pumped (2) to an atomizing spray head in the large evaporating chamber (3) where it meets a blast of hot air and flue gases. They may be provided by a simple gas or oil combustion chamber (4) or by adjacent sources of flue gas blended with excess air. The heated mixture evaporates water from the spent liquor, concentrating the free acid. Vapor laden air is discharged to atmosphere through a wire mesh mist eliminator (5) and stack (6).

Weight of salt held in the ferrous sulphate-sulphuric acid solution decreases as acid concentration increases. (Higher temperatures involved assure the production of monohydrate rather than the heptahydrate that would result from low temperature operation.) The concentrating process causes about 40 per cent of the ferrous sulphate to crystallize out of solution. This slurry drops into crystallizing tanks (7) where 66° Be sulphuric acid from a metering tank (8) is added, raising the acid concentration a second time and dropping out more ferrous sulphate monohydrate. (The make-up required is that actually consumed in the pickling reaction plus normal rinse losses.) Salt concentration is so reduced that on ultimate dilution to pickling strength, the regenerated liquor will contain no more than 2 per cent iron.

The slurry is separated in a vacuum filter (9) and washed to remove residual acid. Dried salt is conveyed (10) to bins (11) or hopper cars (12) for sale or disposal. Mother liquor, which contains about 35 per cent sulphuric acid, is pumped to a holding tank (13) from which it may be metered directly back to the pickling tanks along with dilution water from the rinse tanks. No reheating is required. The temperature, which is lowered in the evaporation step, is brought back to 200°F by the heat of dilution of the fresh acid.

process in the U.S. It recovers and regenerates spent liquor by production of ferrous sulphate.

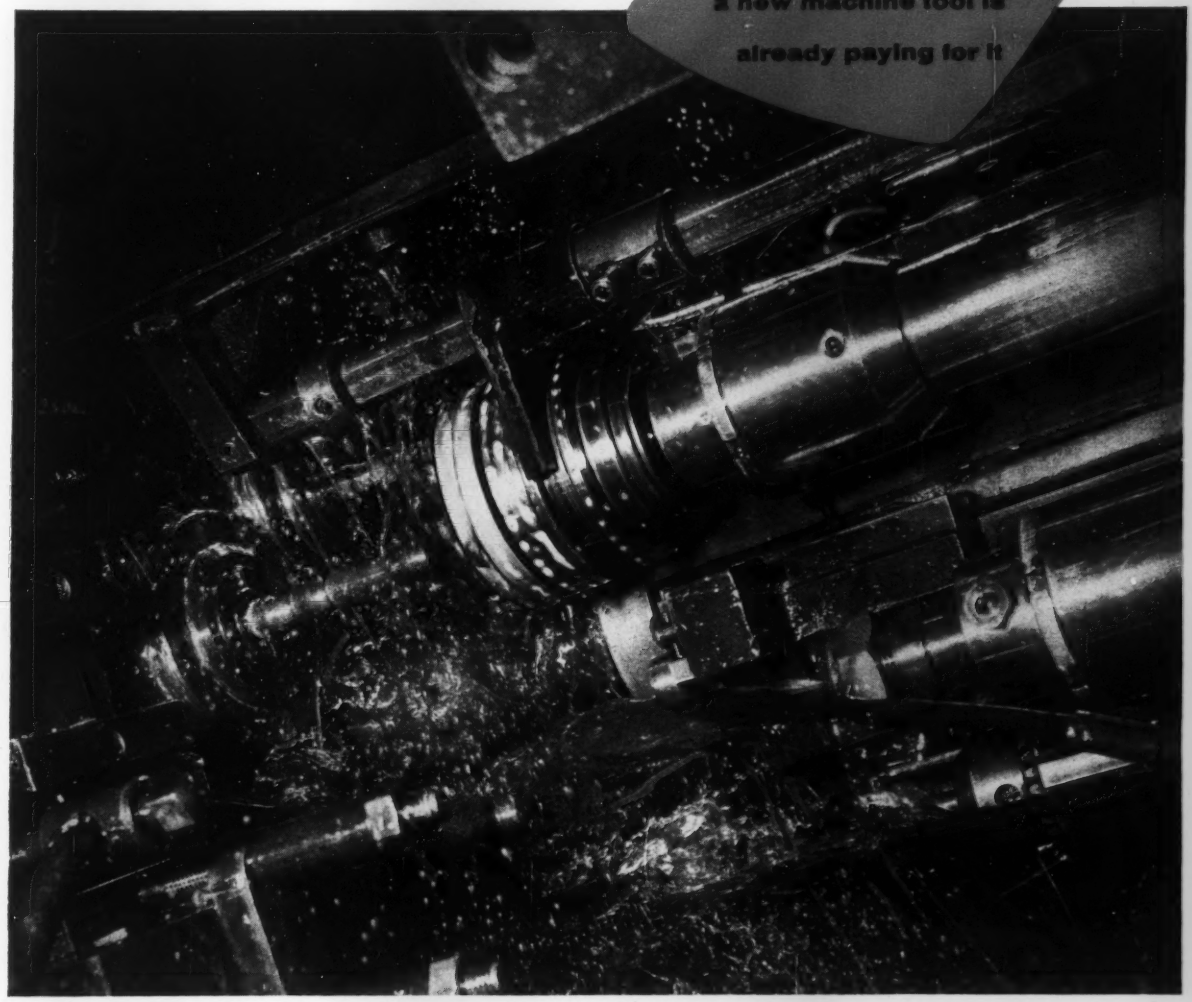
Koppers says of the Zahn method: "Although many solutions have been offered for disposal of pickle liquor, none has been reduced to the technical simplicity and low investment cost of the ferrous sulphate monohydrate method. Steelmakers can install facilities which will recycle fresh pickle liquor at low iron concentrations and normal acid strength. This meets needs of high speed continuous pickling lines and eliminates the costly problem of spent solution disposal."

Advantages — Koppers officials add: "In the monohydrate process, one operator is able to handle all the plant functions with occasional assistance of a yard man. One plant which has used this process for four years has yet to experience a shutdown because of equipment or material failure.

"Installation of a monohydrate regeneration plant provides for use of higher acid concentrations in the baths, permitting higher speed steel processing at no increased cost. Since all the free acid is returned to the process, the quantity of acid required per ton of steel is decreased up to 50 per cent."

JONES & LAMSON THREAD TOOLS

the man who needs a new machine tool is already paying for it



J & L Revolving Tangent Die Heads Give Long-Run Economy, Guaranteed Accuracy

The efficiency of your threading operations rises sharply when you use J & L automatic opening Tangent Die Heads. Revolving types, similar to that illustrated, are available for multi-spindle automatics, drill presses and special machines.

Chasers are changed in mere seconds, without disturbing the die head *or chaser holders;* repetitive tripping permits automatic threading close-to-shoulder; one set of holders handles a full range of coarse, fine and multiple pitches; you get up to 30 foolproof resharpenings with every set of chasers. *And* Class III threads are guaranteed... *every time!*

J & L manufactures complete lines of die heads and chasers; accessories and sharpening equipment; collapsible and solid adjustable taps and chasers; the "Modern-Magic" chuck and automatic releasing stud setters. Send for Thread Tool Catalog. JONES & LAMSON MACHINE COMPANY, 517 Clinton Street, Springfield, Vermont.

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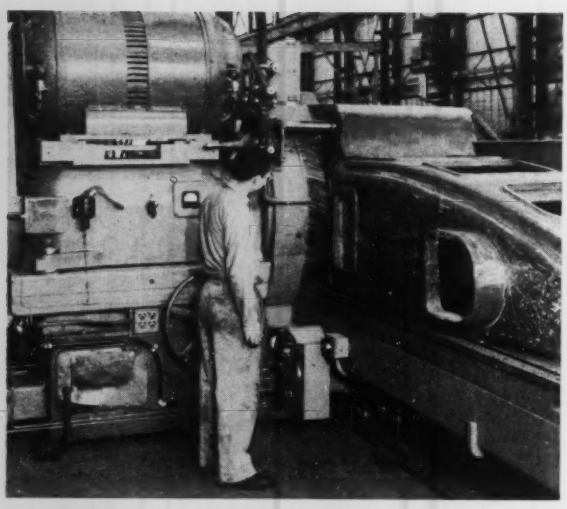
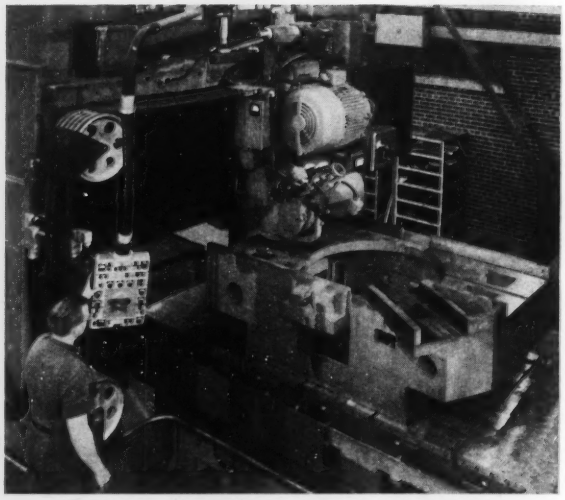


A vertical column for a grinding machine is ground from the rough on this 150-hp face grinder. Wheel is segmented, is 48 in. in diameter and has an 8 x 3 in. face



This horizontal spindle, Plano surface grinder has a 75-hp spindle motor. Here the machine is grinding a machine tool bed casting. Control is complete from the pendant

New Dimensions for Grinders

High horsepower and large capacities are setting them up for bigger metal removal jobs. In some cases they are machining rough castings and forgings

BUILDERS of grinding machines are no longer content to have their equipment narrowly classified as light-duty finishing machines capable of high precision only when stock removal is limited.

Demonstrating one trend in grinding, executives at Mattison Machine Works, Rockford, Ill., recently showed four "Hall of Titan" machines at their plant. As the name implies, the machines combine size and horsepower in ranges not usually linked with grinding.

Breakthrough — Alan Mattison, president, points out: "These machines effectively break through a mental barrier in the minds of many production executives as to what jobs—in relation to size and stock removal requirements—can be handled with greatest economy on grinders."

As Mr. Mattison sees it, there are several reasons for grinding on large, heavy duty jobs, including: 1. The ability to handle interrupted cuts. 2. The fast loading feature of magnetic chucks. 3. Reduced need for stock allowances. 4. Ability of the wheel to take scale and hard spots on rough castings and forgings. 5. Greater precision in finishing with a rotary surface grinder since wheels can be set dead flat. 6. Hardened surfaces, such as machine ways, can be ground readily, yet may defy efficient machining by any other method.

Roughing — The ability of the big grinders to machine parts from the rough is particularly important, Mr. Mattison thinks. In some cases, they will permit a user to accomplish in one machine setup what he's now doing in two or more—and without loss in performance.

Proving the point, Mattison production men are grinding heavy machine castings in their own plant. Removing as much as 3/16-in. stock, a large face grinder can be overloaded to take ¼-in. cuts on the high spots. With the switch to grinding on vertical column castings, the designers have relieved flanges and bosses to provide for an interrupted cut. The redesign was meant to aid the grinding operation, since an interrupted cut allows for broken chips and higher unit pressures, but it also has helped save material in the castings.

In addition to the two machines shown above, Mattison's line-up of big machines includes a 100-hp vertical spindle surface grinder and 75-hp combination way and surface grinder.

JONES & LAMSON OPTICAL COMPARATORS

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Rapid Inspection Between Operations Keeps Quality High, Scrap Low

Things start to happen when J & L Optical Comparators are put to work on production line inspection. Parts — even the most intricate ones — are inspected more easily and more rapidly than ever before. Measurement is precise to .0001″. Parts which undergo several operations are speedily checked *at each stage* of manufacture. Any errors present in production operations are instantly revealed.

As a result of all this, production flow is faster and surer, product quality is kept on a higher level, and *scrap* volume takes a nose dive.

Investigate the possibilities that lie in using J & L Optical Comparators in *your* manufacturing. Send for our latest Comparator Catalog. JONES & LAMSON MACHINE COMPANY, 517 Clinton Street, Springfield, Vermont.

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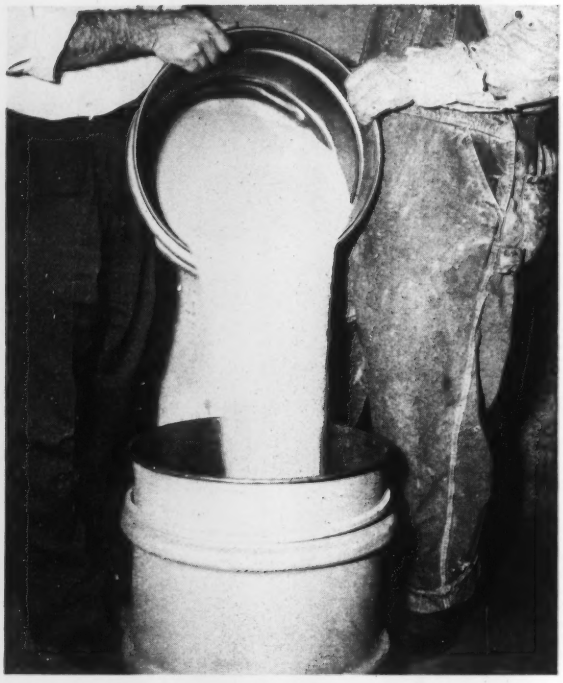

Magnesium is a lot easier to extrude when you use pellets instead of billets. Material (right) is finer than salt

Pellets Make Better Extrusions

Magnesium extrusions are up to 40 per cent stronger than those made from conventional billets, says Dow Chemical Co. Here are some details of the process

PELLETS are replacing billets at the new Dow Chemical Co. rolling and extrusion plant in Madison, Ill.

The process is said to produce magnesium extrusions with compressive yield strengths of 35,000 psi—40 per cent higher than sections extruded conventionally.

Method — In pellet extrusion, small magnesium particles are fed into an extrusion press and forced through a die under heat and pressure. The process is similar to that used with billets.

Dow Chemical says that such extrusions owe their greater strength to the method of making the pellets. The firm developed a way to transform molten magnesium directly into pellets of uniform size. Here is how it's done.

Magnesium is alloyed with small amounts of zinc and zirconium in a melting pot. The alloy (ZK60XB) is transferred to a holding pot where it flows onto a metal disc which spins at high speed. The disc is turned by a bearingless turbine—natural gas powers it and provides an atmosphere in the atomizer vessel.

Pelletizing — When the molten metal strikes the disc, it is hurled toward the walls of the atomizer vessel. During the flight, the magnesium cools from 1400 to about 300°F, solidifying into a sphere. Sizes vary from 0.007 to 0.023 in., depending on disc speed.

As pellets fall to the bottom of the vessel, they cool more and are passed through a screen to insure uniformity.

In the extrusion process, pellets are heated to 650°F, and piped into the extrusion chamber through a flexible tube.

Performance—The chief significance of the pellet extrusion is the latitude it offers in airframe design. Weight reductions can be made without sacrificing strength.

Douglas Aircraft Co., San Diego, has been using flooring substructures fabricated from these extrusions. Its big C-133 uses about 4300 lb of the metal. The experimental C-132 will use more than 8000 lb.

The process was developed by Dow Chemical in co-operation with the Air Force after several years of research.

JONES & LAMSON "AUTOMATION"

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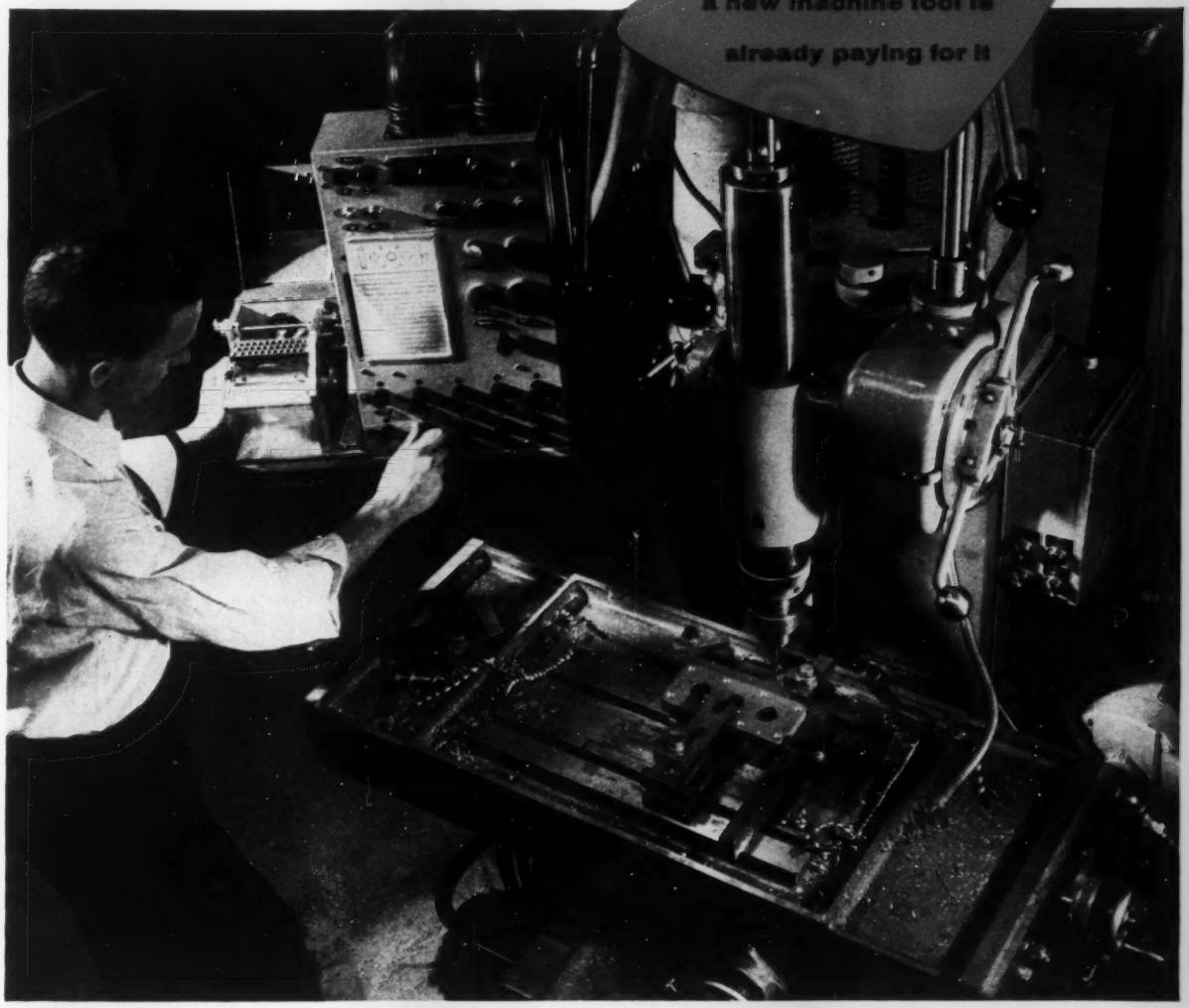

This tape-controlled table eliminates set-up time on small lots

It's natural enough, in a way, to associate "automation" with huge plants and their long, high-speed production lines.

We should also keep in mind, however, that certain "automation" techniques offer tremendous benefits to the *small job shop*. Jones & Lamson research and development have produced remarkable results in applying "automation" to small-lot production.

Are you interested in drastically cutting set-up and change-over time, and greatly increasing your small-lot flexibility? We'd be pleased to show you how the results of our intensive research and development programs can be put to good use in *your* operations.

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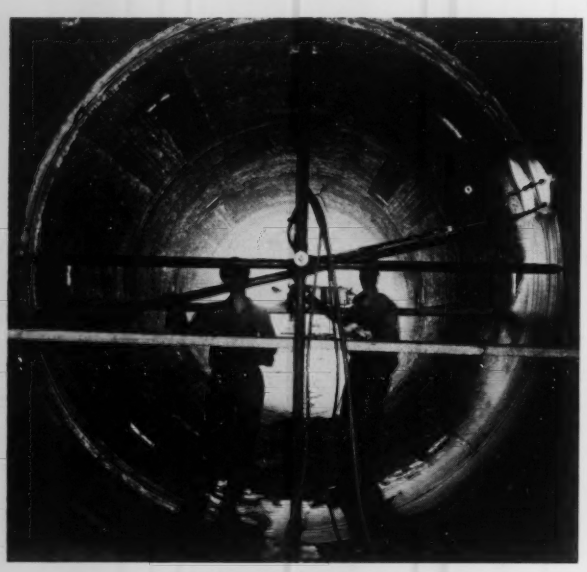
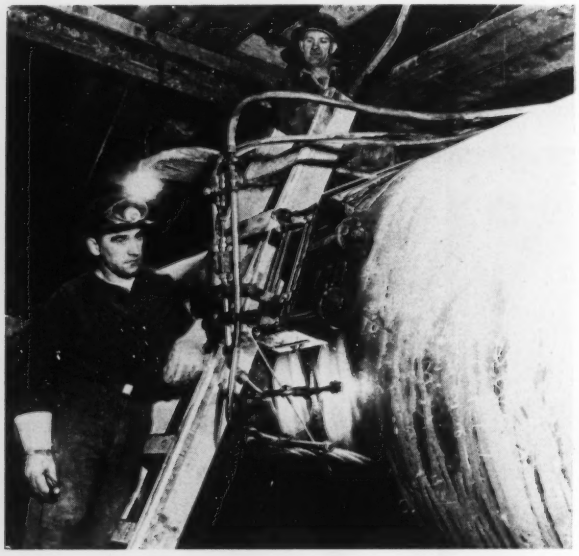


Here is the inside equipment used to stress relieve the penstock. Heating heads and spray are at the right; drive wheel is at the left



This is the outside equipment for stress relief. Carriage speed was co-ordinated with the inside equipment by telephone

Stress Relief Upgrades Pipe Welds

Installing an 11-ft pipeline in a 2400-ft, vertical tunnel calls for careful welding practices. This one was prefabricated to cut down welding on the job

THE Kitimat aluminum smelters in Canada get their electrical power from stations deep inside a mountain.

The turbines are fed by a penstock (pipeline) which drops the water 2400 ft.

Here are some of the methods used to weld the pipeline.

Thickness—The penstock is 11 ft in diameter. Wall thickness varies from 9/16-in. at the top to 1 15/16-in. at the power house.

Each section of the pipe was fabricated in a shop and shipped by barge to Kemano, British Columbia. They were joined into longer sections at several points along the penstock line and lowered into the tunnel by a hoist and hand welded. Crews worked up from the power house and the 1680 ft level to weld, inspect and stress relieve the seams.

After completion, the space between the tunnel and penstock was backfilled with concrete.

Specifications — Penstocks and similar structures do fail—brittle fracture is one cause. Although steels with high resistance to such fractures are available, it was decided to use ASTM A-285 Grade B firebox for plates 1 in. and under, and ASTM A-201 Grade A firebox for plates over 1 in.

Stress relieving is done by the low temperature process developed by Linde Co. Division of Union Carbide Corp., New York. Metal on either side of the weld is heated and followed with a water chill. It expands the plate on either side of the weld, stretching the weld metal. This reduces the yield point tensile stress and lowers the peak stresses in the weld area.

Here's how it works.

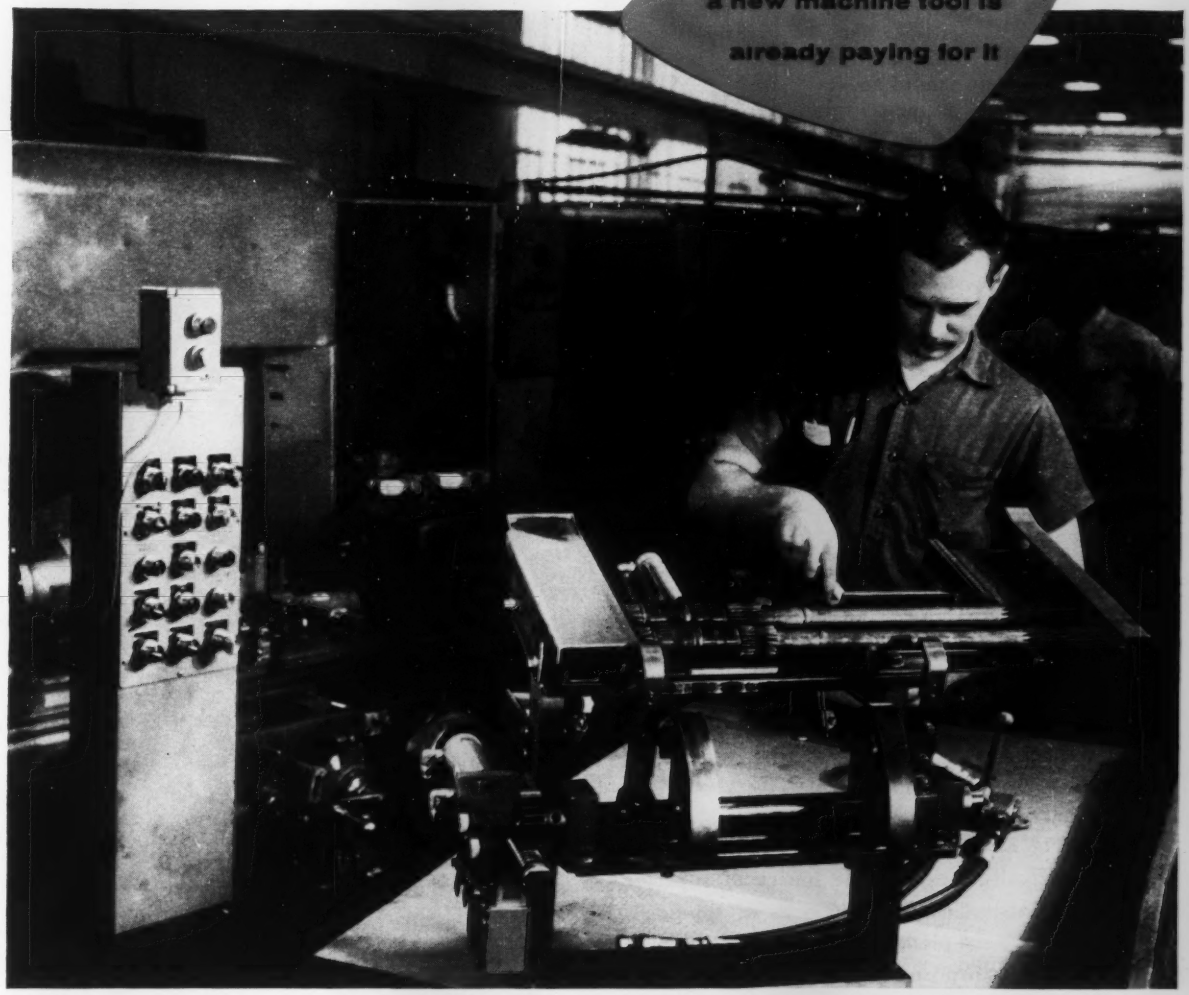
Method—Two, multiflame, oxyacetylene torches straddle the weld. Each heats a band 6 in. wide, leaving an unheated band 4 in. wide with the weld in the center. About 6 or 8 in. behind the torches, it is quenched with water or air. Maximum surface temperatures are kept just below 450°F.

Engineers devised a novel method of mounting the stress relieving heating heads inside the penstock (see illustration). A cutting machine carriage was mounted on a platform. A spider arrangement supported a rotating boom mounted on an axle at the center line of the penstock. One of the drive wheels for the cutting machine carriage was removed and the axle used to drive a flexible shaft which terminated in a gear system at the outer end of the boom. The gear system powered a drive wheel which tracked around the weld. The boom also held the water cooling apparatus.

A total of 6493 ft of seams were treated. Over 5 million cu ft of oxygen and nearly 2 million cu ft of acetylene were used.

JONES & LAMSON FORM GRINDERS

the man who needs a new machine tool is already paying for it



Full Versatility to Suit Your Needs... Both Manual and Automatic

By using the automatic handling device shown above, a J & L Model E Form Grinder can handle 113 pieces per hour. Four grinding wheels plunge grind in one operation, to very close tolerances.

Other Model E's along this assembly line are equipped for crush wheel, or diamond trueing; automatic or manual handling; chucking work, center work or shoe-type support, depending on the work to be done.

This is an example of how plunge form grinding is being used in many plants to perform a great variety of work. Its superiority over other methods offers great benefits, in terms of versatility, accuracy and speed. Learn how J & L Form Grinders can help improve *your* production.

Write for Form Grinder Catalog, JONES & LAMSON MACHINE COMPANY, 517 Clinton Street, Springfield, Vermont.

Turret Lathes • Fay Automatic Lathes • Milling & Centering Machines • Optical Comparators • Thread Tools • Thread & Form Grinders

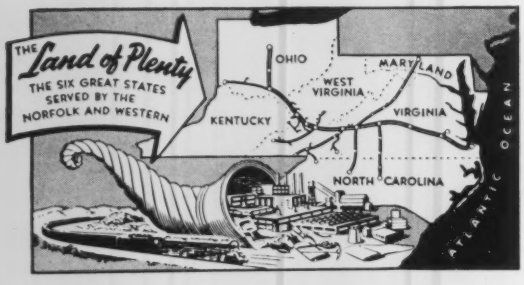
Rule No. 1 for Catching Flies and Making Steel—

BE IN THE RIGHT SPOT!

The Land of Plenty is the right spot, with its virtually inexhaustible source of superior Bituminous Coal, vast deposits of top-grade limestone and plenty of industrial water. Ore can be transported economically from the strategically located Port of Norfolk on famed Hampton Roads.

There's also adequate power and a dependable manpower pool. Add a moderate climate which will never interfere with your operations, and you'll understand why we call this area the Land of Plenty.

Considering these major production advantages—plus a market using over a million tons of steel a year — the Land of Plenty is an ideal location for the successful operation of a steel mill.



Write, wire or phone–

L. E. Ward, Jr., Manager
Industrial and Agricultural Dept.
Drawer S-759 (Telephone 4-1451, Ext. 474)
Norfolk and Western Railway
Roanoke, Virginia

Norfolk and Western RAILWAY

Buffing leaves a high polish or velvet appearance, depending on abrasive used. Operator here is buffing brushes before an enameling operation at Empire Brushes Inc., Port Chester, N. Y.

More Colors for Copper

They range from natural red-gold through blue, black and green. You can change colors by varying composition, treatment and coatings. Finishing provides more glamor

COPPER is the only common metal with a natural red-gold color. Add its weather and corrosion resistant properties and you have an exceptionally attractive and useful material. It combines readily with atmospheric elements to form colorful protective coatings which range from dark brown to blue-green (verdigris).

Alloys containing zinc, tin or nickel offer more colors. Chemical treatment and mechanical treatment produce still more colorful effects.

Here are some facts about colors and how you can use them to improve your product.

What It Is—The Copper & Brass Research Association, New York, defines a copper-base alloy as a metal which contains more copper than any other element.

Traditionally, brass is an alloy of copper and zinc; bronze, of copper and tin. Today, brass is any copper alloy in which zinc is the principal alloying element.

Most true bronzes are called phosphor bronzes. Phosphor added to a melt prevents the formation of oxides in the alloy. Bronze also applies to alloys in which the principal alloying element is neither tin nor zinc: Aluminum bronze, silicon bronze and beryllium bronze are examples.

Natural Colors — Depending on composition, copper alloys range from red through gold and yellow to silvery white. Zinc changes the color to bronze, red-gold and a bright yellow (35 per cent zinc). As more zinc is added, the alloy (brass) becomes red. Muntz metal, which contains 40 per cent zinc, is golden buff red.

Tin lightens copper alloys—the more tin, the lighter the color.

Nickel silvers look like silver. They contain varying amounts of nickel and zinc and sometimes small amounts of lead.

It's a good rule to choose copper-zinc alloys for brass or bronze tones and nickel silvers for variations of silver-white.

Remember that copper-zinc alloys are cheaper than copper-tin combinations.

Coatings—Aging and weathering produce oxide and sulphide coatings. Artificially produced films are more uniform and attractive. The color range is wider than that of natural films. When you use chemically colored alloys, you produce thin films which clearly show the metal beneath. Textures produced by brushing, mottling, polishing or buffing augment the coloring effect. Coloring is influenced by the solution, bath temperature and immersion time.

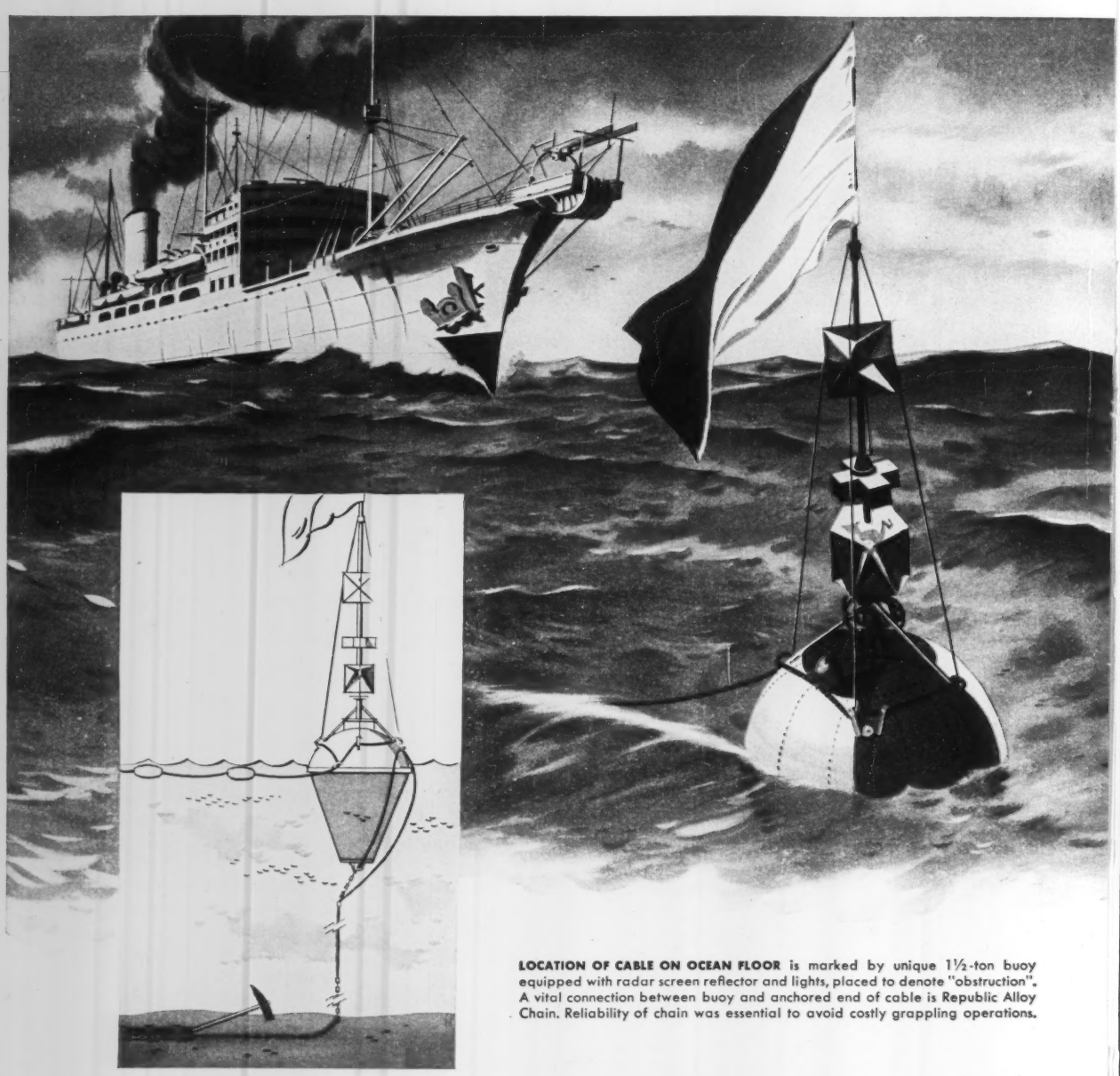
Formulas—There are many patented processes for coloring other metals, like cadmium, zinc and aluminum, which work well with copper and brass. The table (page 144) lists many of the common coloring formulas.

Remember that many colors are not permanent or light fast. It's a good idea to protect the finish with a coat of lacquer.

Matching coatings requires exact reproduction of materials: Metal composition, formula and physical conditions. Matching the color of bare cold-rolled alloys is not dif-

(*Please turn to page* 144)

Republic Alloy Chain



LOCATION OF CABLE ON OCEAN FLOOR is marked by unique 1½-ton buoy equipped with radar screen reflector and lights, placed to denote "obstruction". A vital connection between buoy and anchored end of cable is Republic Alloy Chain. Reliability of chain was essential to avoid costly grappling operations.

REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels

helped "hold the line"

FOR TRANSATLANTIC TELEPHONE CABLE

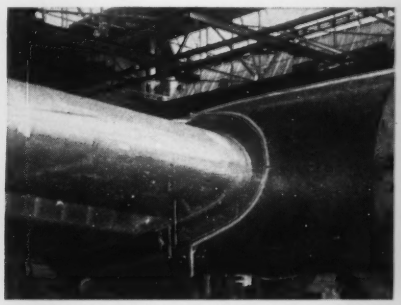
A number of times during laying of the recently completed twin transatlantic telephone cable, it was necessary to suspend operations while the cableship Monarch returned to port for additional cable. Whenever Republic Alloy Chain was used, it helped "hold the line", securely anchoring a specially built marker buoy to the cable resting on the ocean floor. Result: the cable was easily recovered, spliced to the newly arrived portion, and laying resumed without incident.

Security of the buoy and recovery of the cable depended on the built-in quality of Republic Alloy Chain. Uniform strength in every link spelled the difference between a smooth, on-schedule operation and costly, grappling delays.

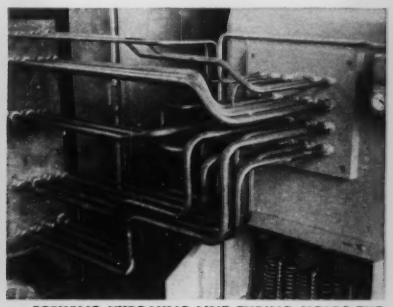
Attention to quality and reliability in every detail was vital to success in completing the $42,000,000 transatlantic telephone cable. As it has in countless product and production applications in every industry, Republic Chain met every requirement with flying colors.

Whatever your chain problem or application, it will pay you to get all the facts on Republic Chain Products. Types available include fire welded, electric welded or weldless chain in high carbon, low carbon, alloy and stainless steels, or wrought iron. Simply contact your Bolt and Chain Division representative, or mail the coupon for further information.

CONTINUOUS GALVANIZED HOLDS THE LINE on costs when used for production-line products requiring severe forming. Expensive hot-dip galvanizing after fabrication can be eliminated. The tight, corrosion-resistant zinc coating of Republic Continuous Galvanized Sheet Steel will not crack, flake, or peel under any forming process permitted by the base metal. For complete information on this new production-line material, mail coupon.



TITANIUM HOLDS THE LINE on excess weight in this new commercial airliner. By substituting titanium for other metals normally used in nacelle construction, a weight savings per airplane was achieved equal to one passenger and his luggage. Strength and safety were not impaired in any way. In addition to great strength-to-weight ratio, titanium offers excellent corrosion resistance. Send coupon for details.



REPUBLIC HYDRAULIC LINE TUBING HOLDS THE LINE where high-pressure dependability is vital. Reason is Republic's ELECTRUNITE® welding process coupled with closely controlled finishing operations. Starting with flat-rolled steel, and working to a highly restricted specification, maintains a flaw-free surface on both the O.D. and I.D., and assures a uniform wall thickness. The result is a quality tube with uniform strength and ductility, the basis of unsurpassed performance in high-pressure applications.

REPUBLIC STEEL CORPORATION
Dept. C-3233
3120 East 45th Street, Cleveland 27, Ohio

Please send me further information on:

- ☐ Chain Products
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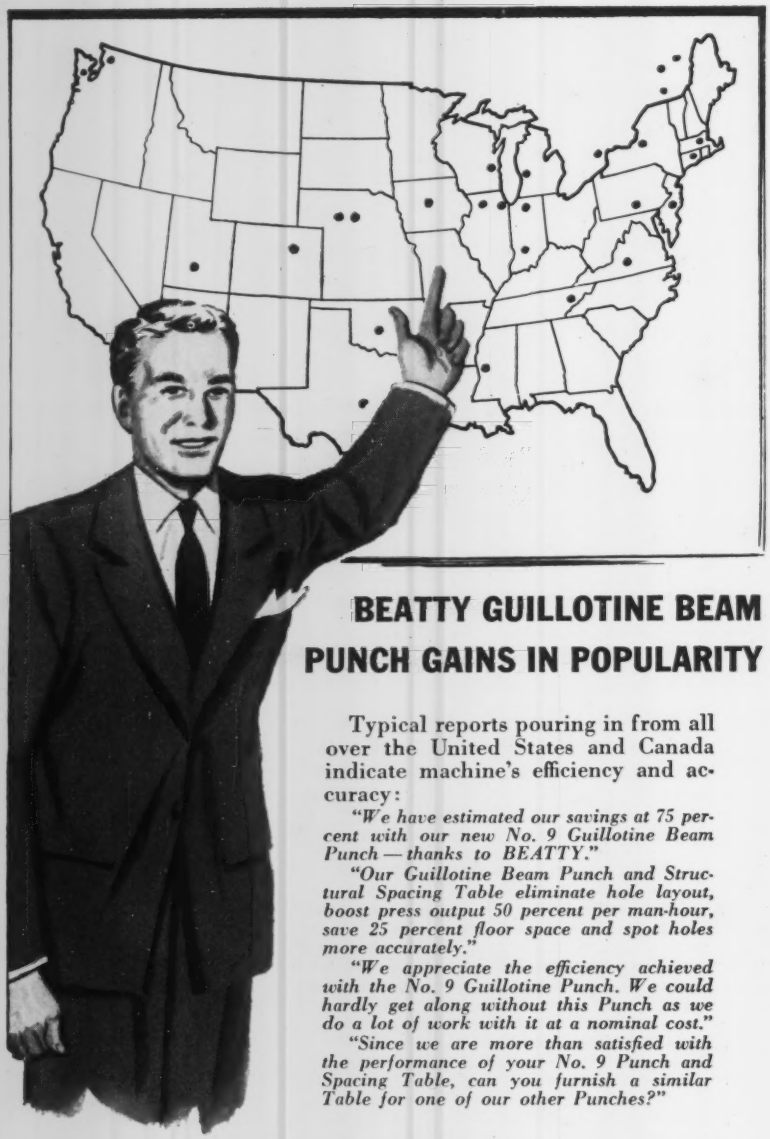
STEEL

and Steel Products



BEATTY GUILLOTINE BEAM PUNCH GAINS IN POPULARITY

Typical reports pouring in from all over the United States and Canada indicate machine's efficiency and accuracy:

"We have estimated our savings at 75 percent with our new No. 9 Guillotine Beam Punch — thanks to BEATTY."

"Our Guillotine Beam Punch and Structural Spacing Table eliminate hole layout, boost press output 50 percent per man-hour, save 25 percent floor space and spot holes more accurately."

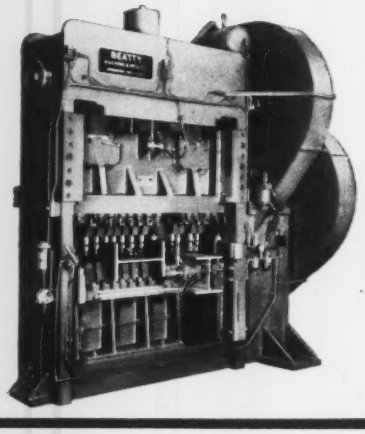
"We appreciate the efficiency achieved with the No. 9 Guillotine Punch. We could hardly get along without this Punch as we do a lot of work with it at a nominal cost."

"Since we are more than satisfied with the performance of your No. 9 Punch and Spacing Table, can you furnish a similar Table for one of our other Punches?"

PRODUCTION GIANT REQUIRES LESS FLOOR SPACE

Ideal machines for punching flanges and webs of beams, Beatty Guillotine Beam Punches require less floor space, offer lower first cost and extreme rigidity. Large die space, clear working space and two-point application of force to the ram affords full capacity loading and punching across the face of the ram.

200-ton Model 9, illustrated, for beams up to 30", punches all holes in web of 30" beam. 150 and 350 ton models also available.



Write For Full Details

BEATTY MACHINE & MFG. CO.

966 150th St., HAMMOND, IND.

MORE COLOR . . .

ficult, but it is more so when the materials have been extruded, rolled, drawn or annealed. Matching the color of wrought alloys with that of castings is also difficult. In most cases, nonstandard alloys have to be used for wrought products when matching cast or extruded parts.

Here are some typical colors and the formulas for matching them:

- Rich Bronze — Use commercial bronze (copper 90 per cent, zinc 10) for a warm bronze color. Drawn shapes and sheets will match closely. Extruded parts will not match drawn shapes. Castings to match can be made of copper (86 per cent), zinc (8), tin (4) and lead (2).
- Red Gold—Use red brass (copper 85 per cent, zinc 15) to get a golden bronze. If you are using extruded shapes, use this formula to match red brass sheets and tubes: Copper (55 to 58 per cent), lead (2 to 3.25), balance zinc. For castings, use: Copper (83 per cent), zinc (11), tin (4.5), and lead (1.5).
- Silver Blue-White — The most brilliant silver sheets and tubing are made of copper (75 per cent), nickel (20) and zinc (5). Castings to match would consist of copper (64.5 per cent), nickel (20), tin (3), lead (5) and zinc (7.5).
- Yellow White — Use a 65-10 nickel silver.
- White or Silver—Use one of the nickel silvers.

Mechanical Finishes—For many applications, mill finishes aren't attractive enough. Here are some facts about bright and dull finishes, tones and effects you can use to improve the appearance of copper alloys.

These factors affect final appearance:

- Mill finish.
- Polishing and buffing techniques.
- Annealing.
- Grain size.

You can determine grain size with a microscope. A sample is polished and etched; measurements taken are the average diameters of grains and are given in millimeters. Grain size indicates hardness and working properties—important factors in selecting the right kind of finishing.

(*Please turn to page* 146)

These 120-foot high-tension towers carry power across the 50 miles between Aluminium Limited's Kemano generating station and Kitimat smelter.

12-story aluminum towers carry world's largest high-tension cables

Across Canada's weather-wild Kildala Pass, aluminum is meeting a new challenge in structural design. These giant towers withstand tons of snow and wind pressure . . . support half-mile spans of ice-laden cable. Yet they were delivered by helicopter in prefabricated sections for quick assembly on the spot.

Aluminum a Natural

Aluminum was a natural for this job, since its properties match the specifications for strength, weatherproofness, light weight and easy assembly. Comparable steel towers would be 65% heavier and require 2⅓ times the man-hours to assemble.

Easily Fabricated

Created and engineered by Aluminium Limited, these towers also show how easily aluminum is fabricated. The tubular leg sections are formed in diameters to 38" by welding semicircular halves of rolled sheet. Crossarms are box girders up to 76 feet long, assembled with aluminum rivets.

New Fabricator Markets

With this knowledge and experience, independent U. S. fabricators can look for more business in heavy structural applications. To assure a dependable supply of primary metal for these future needs, Aluminium Limited is investing $3,000,000 a week in production facilities. Research, development and technical assistance programs are also expanding to further advance aluminum's position as the world's fastest growing metal.

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Aluminium Limited *Sales, Inc.*

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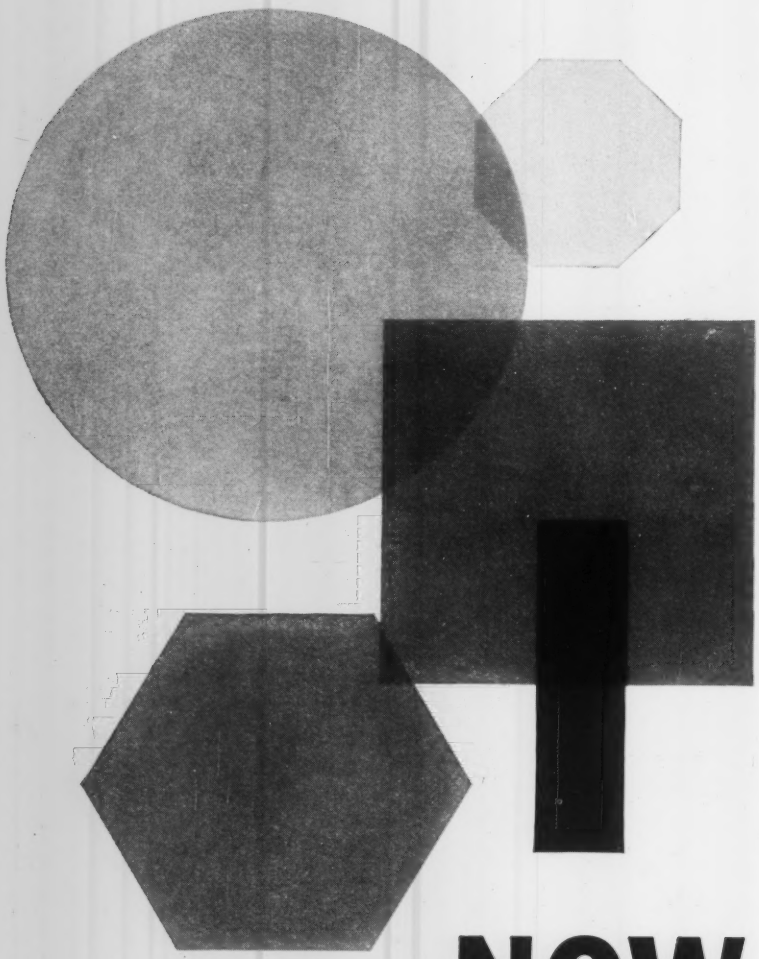

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Write today to our Cambridge office for your *free* Wheelock, Lovejoy Data Sheets. They contain complete technical information on grades, applications, physical properties, tests, heat treating, etc.

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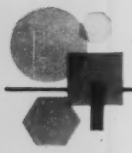


WHEELOCK, LOVEJOY & COMPANY, INC.

131 Sidney Street, Cambridge 39, Mass.

MORE COLOR . . .

Grain size changes during annealing. A low annealing temperature or short annealing time produces small grains. A higher temperature or longer annealing time increases grain size.

The grain size that's best depends on metal thickness and the fabrication method you select. Sheet brass with grains larger than 0.050 millimeters will show some orange peel effects when deep drawn. Brass with 0.025-mm grains will deep draw and leave a smooth surface that requires less finishing than the 0.050-mm size. An important point: Reducing grain size lowers ductility and drawability. At least one firm makes a fine grained brass that draws well. (See STEEL, Dec. 24, 1956, p. 66.)

Specify the smallest practicable grain size if you're going to polish the parts. With modern techniques, grain sizes as low as 0.005 mm have been made. Parts made from metals with grains that size will have smooth surfaces even after bending, drawing or forming. Buffing takes less time than it does with material that has longer grains.

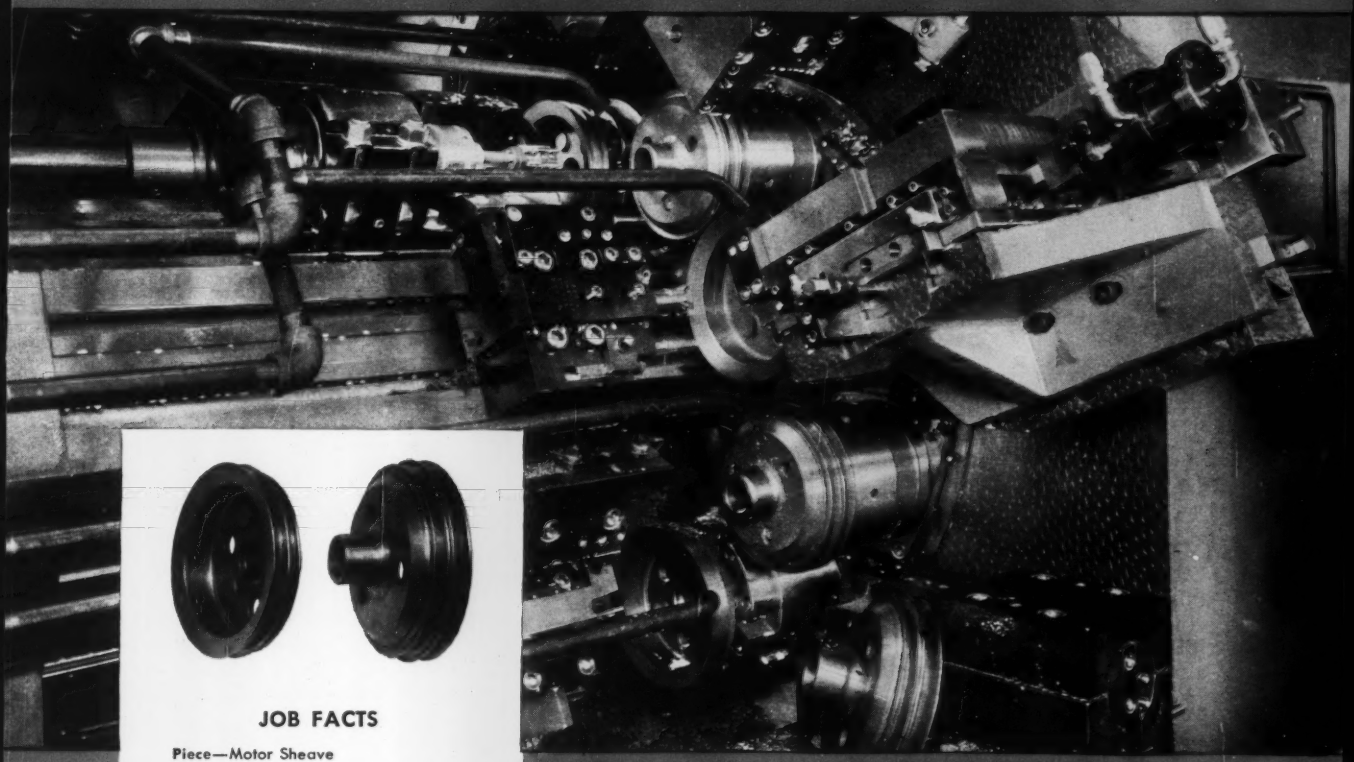
Bulk Techniques — There are seven ways to finish large quantities of small parts: Tumbling, ball burnishing, bright dipping, matte dipping, electrolytic polishing, acid pickling and blast or vapor cleaning. Used separately or in combination, they bright finish or condition the surface of the parts.

Wet or dry barrel tumbling is used. Dry: The barrel is partially filled with powdered pumice, sand, iron slugs or steel balls, and the parts added. Speed is 20 to 60 rpm. Wet: Caustic soda, cyanide and water are added. Result: A good surface preparation for buffing or polishing. The method isn't suited for fragile parts or those with deep depressions or projections.

Ball burnishing is a refinement of barrel tumbling. The work is rotated for 6 to 48 hours. The tumbling medium is soap, cream of tartar and soap bark. Balls or other shapes are 1/16 to ½-in. in diameter.

For a matte finish, bright finish first; rinse and dip the parts in a weak solution of sodium cyanide

with an Acme-Gridley 8 SPINDLE CHUCKER...



JOB FACTS

Piece—Motor Sheave

Material—Cast iron $3\frac{1}{2}$" long, $7\frac{3}{8}$" diameter

Operations—Machine arranged for double indexing to complete both ends of piece simultaneously. 26 operations (13 on each end) including skiving. Carbide tooling used throughout.

Machine Time—49 seconds

Machine—8 inch 8 spindle Acme-Gridley chucking automatic.

Ask for our representative to tell you more about Acme-Gridley BASIC DESIGN. Meanwhile write for Bulletin CM-44 showing 25 different tooling setups on chucking jobs.

you get these advantages

Maximum production, at lowest cost per piece, is assured because of:

GREATER TOOLING FLEXIBILITY . . . the result of Acme-Gridley sound *basic* design.

DOUBLE INDEXING . . . which lets you finish *both* ends of the piece *at one time*, more accurately, with less handling—as fast as modern tools can take it.

INGENIOUS TOOLING ENGINEERING . . . that comes *only* from COMPLETE LINE experience.

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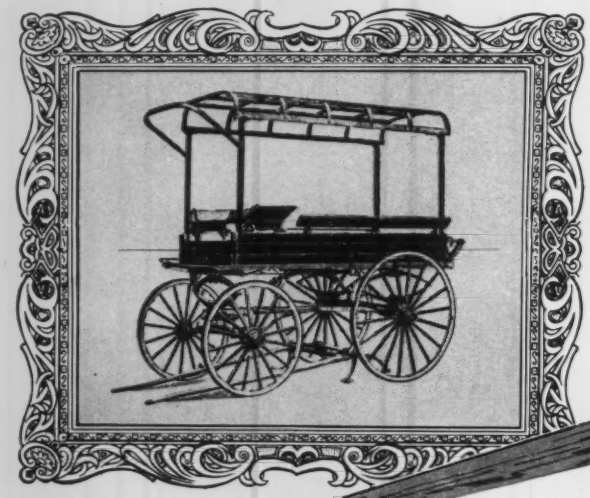
How about Malleable?



Wagon of about the year 1885, completely "ironed" with standard malleable iron castings.

New metals aren't the only answer! For 130 years malleable iron has kept pace with modern design requirements

Malleable proved its worth long ago in parts requiring toughness, ductility and resistance to shock. Through years of processing refinements, today's malleable iron is a superior metal, adaptable to meet job demands—ties in with modern-age requirements.

Versatile castability, high ratio of yield point to ultimate strength, and remarkable ease of machining mark malleable for new uses every day. And still further advancements in malleable and pearlitic malleable production assure higher capacity to serve new users whose forward planning and design awareness recognize the many advantages of this "old-new" material.

It's worth your while to take malleable iron castings into consideration when designing new products or when seeking new cost and assembly savings. Consult your nearest malleable foundry, or write to this Society for information.

Malleable FOUNDERS' SOCIETY

1800 Union Commerce Building Cleveland 14, Ohio

MORE COLOR . . .

and rinse again. Parts are dipped in a solution of 2 gallons of sulphuric acid, 1 gallon of nitric acid and supersaturated zinc oxide or sulphate.

Polishing, Buffing — These finishes are closely related to grinding. Grinding generally produces the coarser finish. Polishing uses softer wheels. Buffing is a refinement of polishing which uses soft abrasives and wheels and is capable of mirror finishes.

In brushing, the work is held against a wheel made of wire or Tampico fiber. This produces parallel, uniformly deep and wide scratch lines. Lined finishes are usually dull or like velvet.

Mill Surfaces — Sometimes you can get the effect you want by specifying a standard mill design. They are furnished in a wide variety of flat strips or rolls. Thickness varies from 0.010 to 0.064 in.

To assist you in selecting the right kind of finish, here are a few formulas which are widely used for parts in bulk:

Bright Dipping

Sulphuric acid	2 gal
Nitric acid	1 gal
Water	1-2 qt
Hydrochloric acid	½-fl oz

Use at room temperature. If spotting occurs, substitute salt for hydrochloric acid, or add wood soot and activated carbon. Be sure to remove any scale with a scaling dip made from equal parts of nitric acid and water. Rinse parts thoroughly after bright dipping.

Sometimes a semibright finish is satisfactory. Here is a formula for a less expensive dichromate dip:

Sulphuric acid	12 oz
Sodium dichromate	8 oz
Water	1 gal

Use at room temperature.

Matte Dipping

Bright dip parts. Rinse and dip in a weak solution of sodium cyanide. Rinse and dry. Follow with a dip in:

Sulphuric acid	2 gal
Nitric acid	1 gal
Zinc oxide or sulphate	supersaturated

Keep the work in solution until chemical action ceases. Use at 180°F; stir occasionally; keep water away. More nitric in the for-

Here's how Bearings, Inc. helped a customer save $2,000 in 60 days!

By removing bearing inventories from several departments to one centrally located stockroom, establishing records showing every application for every bearing, the bin number where these bearings are stocked and the quantity on hand, our engineers saved our customer money and made all bearings immediately available. Many identical bearings bought by several departments for many types of machines were found in quantities exceeding normal requirements. Many bearings were unuseable — unwrapped, dirty and rusty. A few of these bearings are shown above with W. J. Lukach, Bearings, Inc. sales engineer who supervised cleaning, greasing and re-wrapping all bearings not in original boxes.

THE PAYOFF OF OUR SERVICE, ACCORDING TO OUR CUSTOMER, EMPIRE STEEL CORPORATION AT MANSFIELD, OHIO, WAS A SAVING ON BEARING PURCHASES OF $2,000 IN LESS THAN TWO MONTHS.

This is not an isolated example of our services — surveys of bearing requirements, inventory control, application engineering, maintenance schedules and procedures are a regular and continuing part of our service to all customers to whom we supply replacement bearings. Ask how we can help YOU!

Providing bearing service in the territories adjacent to our branches, listed below.

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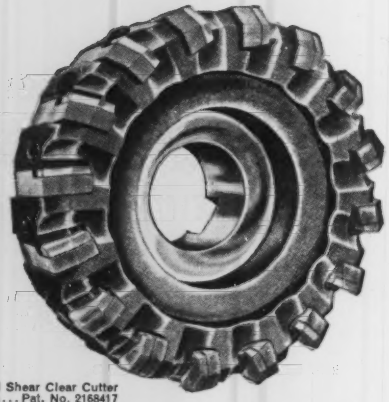


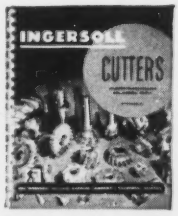
Ingersoll Shear Clear Cutter
27600 series... Pat. No. 2168417
Page 14, Catalog 66

Feed rate increased 2½ to 5 times at Vaughn with this INGERSOLL SHEAR CLEAR® CUTTER

The cutter previously used was nullifying the investment in a new standard, knee-type milling machine. The machine had more power than was being utilized. The feed rate was only 12″ per minute. The change to Ingersoll Shear Clear permitted the Vaughn Machine Company, Cuyahoga Falls, Ohio, to capitalize on its machine investment and obtain the economy and efficiency of increased feed rate. A feed range of 30″ to 60″ per minute, when milling rough forgings and steel castings, is now continuously maintained.

Ingersoll inserted blade cutters are used on all makes of machines for milling and boring a wide range of materials. An Ingersoll Cutter Division representative will be glad to discuss this and other feed rate experiences with you.

Whether you are concerned with feed rates, longer tool life, finish or cutter costs, the new Ingersoll cutter catalog will be a valuable guide. Write Department 66V.



Use this new 82 page guide for selecting the right inserted blade milling and boring cutters for your work. Write for catalog #66, today.

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WAYNE DIE & TOOL CORP.

CUTTER DIVISION

THE INGERSOLL MILLING MACHINE COMPANY

ROCKFORD ILLINOIS

MORE COLOR . . .

mula will coarsen the finish; more sulphuric refines. Follow with a rinse, another bright dip and rinse.

If you want a dull finish, use this solution at room temperature:

Hydrochloric acid	1 gal
40° (Baume) ferric chloride solution	1 gal

Rinse and immerse in dichromate dip to remove smut.

Electrolytic Polishing

By making parts into anodes in a suitable electrolyte, you can produce a finish ranging from light matte to a bright polish. Such parts are free from the mechanical stresses left by mechanical methods. Finish with a cold water rinse. Here is a typical solution (U.S. Patent 2,330,170):

Water	100 parts
Chromic acid	12.5 parts
Sodium dichromate	37.5 parts
Acetic acid	12.5 parts
Sulphuric acid	10 parts

Acid Pickling

To remove oxides developed by annealing, use this solution:

Sulphuric (sp gr 1.84)	½ to 1 gal
	½ to 1 gal
Water	9 gal
Temperature	Room to 150°F

For heavier scale, use a hotter, more concentrated solution.

If you also want to remove the red stain on brass and bronze, use this solution at room temperature:

Sulphuric acid	12 oz
Sodium dichromate	8 oz
Water	1 gal

Or this one:

Sulphuric acid	13 oz
*Ferric sulphate	13 oz
Water	1 gal

Low copper alloys: 120-140°F

High copper alloys: 140-175°F

*Dissolve ferric sulphate in a little water, heated if necessary.

Use the lowest concentration for the finish you want. Pitting or etching is caused by strong solutions or lengthy immersion. Rinse or treat with a neutralizer.

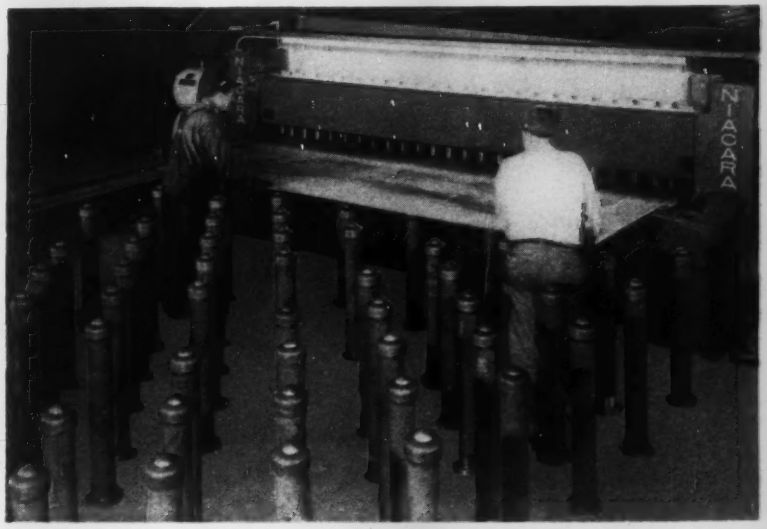
Blast or Vapor Cleaning

Coffee grounds, rice husks, coconut shell meal, seeds and plastics—are thrown at 250 to 350 fps. Use rotating wheels or air.

Vapor blasting uses much higher speeds (3200 fps) and the abrasive material is finer (1200 mesh particles) and mixed with water.

OVER 50 YEARS of Engineering and Manufacturing Experience

make MATHEWS CONVEYERS your best buy



A typical installation of heavy duty ball transfers designed to handle plates at brakes and shears.

It was over 50 years ago that the first Mathews Conveyers were designed and built—and from that early equipment has come the development of the Mathews **continuous flow** conveying systems of today. In these 50 years Mathews engineers have developed a complete line of gravity and power conveyers and special conveying machinery to serve the metalworking industries in the United States and Canada. Whatever is required in the way of modern conveying machinery, you'll find that Mathews has it, and that Mathews Conveyers are your best buy.

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MATHEWS

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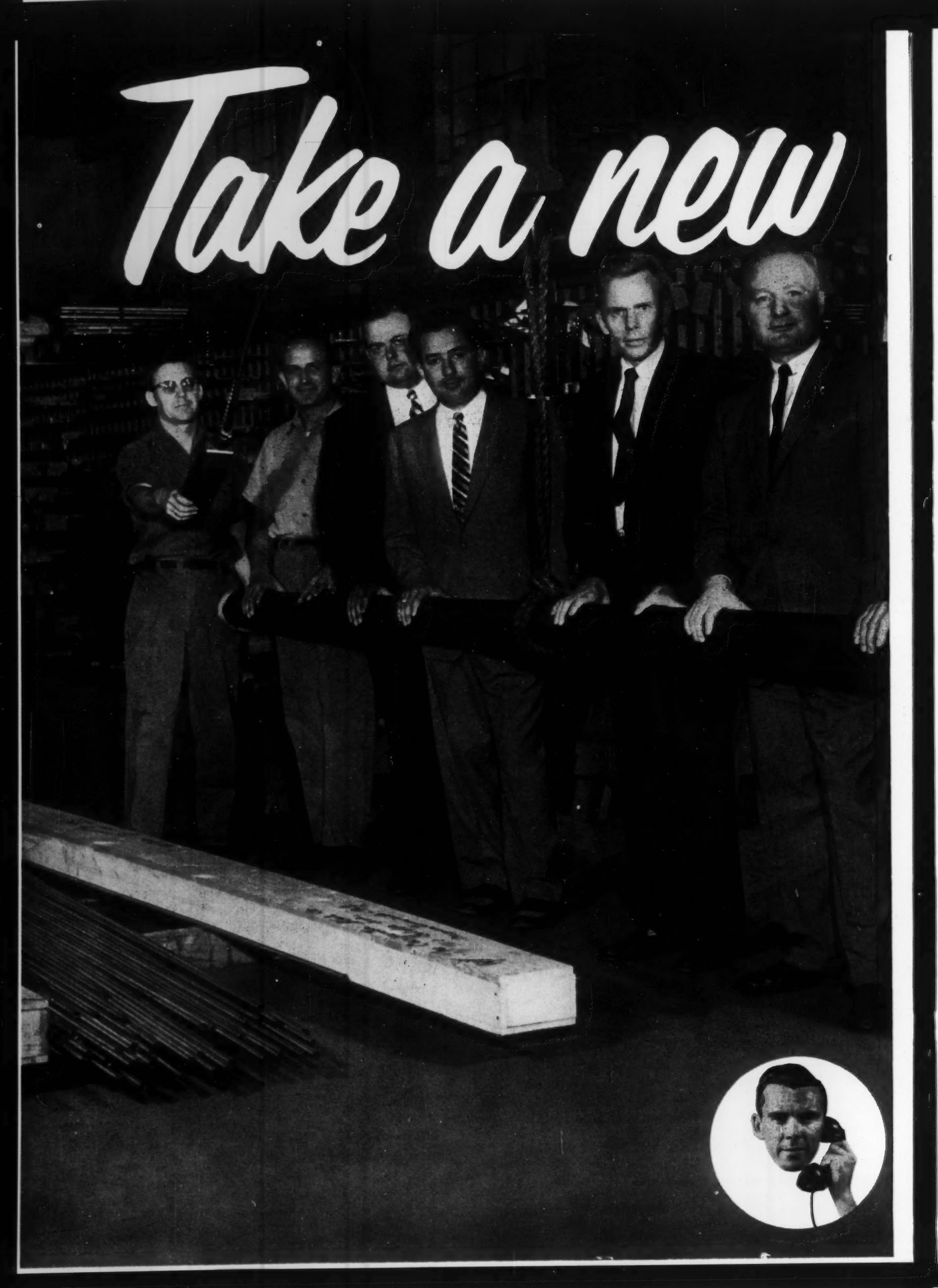


at how *Carpenter* can help you free dollars for more productive uses

As you know, every dollar tied up in inventory shortens productive cash by an equal amount. And inactive stocks of specialty steels are an unnecessary luxury.

That's why we ask—have you called Carpenter lately?

If not, you may be missing a good bet to shift inventory cash into more profitable channels. Here's why.

Your Carpenter Mill-Branch Warehouse is now in the best position ever to meet your day-to-day needs for tool, stainless and alloy steels . . . quickly and without hesitation.

What's more, this comprehensive Mill-Branch Warehouse program is backed by direct service from the Reading Mill to quickly meet unusual requests for special grades and sizes.

Add together the order desk people . . . your Carpenter Representative . . . the warehouse crew, and the office staff, and you have *team action* that spells increased dependability. Whether you want information on prices . . . technical literature to simplify heat treating . . . or actual in-shop assistance — there's a specialist at Carpenter ready to help you.

Start today! Let your nearby Carpenter Mill-Branch Warehouse be your own stock room . . . help you free your inventory dollars for more productive uses. A phone call is all that's needed to get you underway. The Carpenter Steel Co., 139 W. Bern St., Reading, Pa.

Carpenter STEEL

Mill-Branch Warehouse Service

Mill-Branch Warehouses, Offices and Distributors in Principal U. S. Cities

Boosts Finishing Efficiency

Spray painting facilities are tailored to handle wide range of products at machine tool plant

CUSTOM spray painting facilities have increased production efficiency and reduced labor and material costs at Bullard Co., Bridgeport, Conn.

The machine tool producer has a wide range of products—from parts weighing less than a pound to vertical turret lathes which stand 12 ft high and weigh 35 tons. To finish this equipment quickly and efficiently, the company uses six different spray booths, which were tailored to its requirements by Binks Mfg. Co., Chicago.

Dry type spray booths are used because they are not in continuous use. Exhaust facilities can be turned on and off quickly and easily.

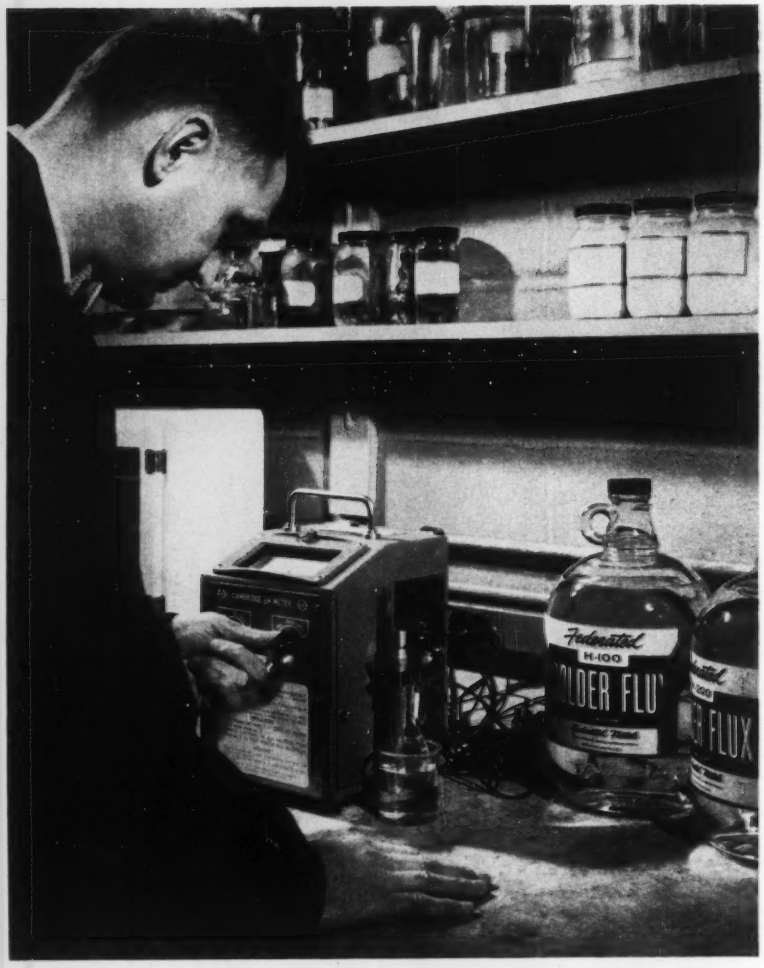
Large castings are cleaned, chipped and filled, then sent to the foundry's large booth for painting. Smaller castings are shot cleaned, ground and finished. They are moved to the two smaller booths in the machining division.

A coat of gray paint is applied to the castings with spray guns. The paint is contained in pressure tanks with air-powered agitators. The density and pattern of the spray are easily controlled by nozzle adjustments on the guns.

The two booths in the machining division have turntables which enable the operator to easily swivel the parts into position for fast, even paint application. In the large foundry booth, ample hose lengths and plenty of working room enable the operator to attain maximum spray efficiency and even quality with castings weighing up to 17 tons.

Exhaust fans are at the top and rear of all booths. They draw overspray through a bank of air filters which remove all paint particles. The filtered air passes through large ducts and is exhausted into the outside atmosphere.

Fans and air filters work together to remove paint particles and keep surrounding air clean. This benefits spray operators and



FEDERATED COMPETITIVELY TESTED FLUXES

A-SERIES FLUXES

Acid base fluxes with superior cleaning ability, excellent solder spread.

H-SERIES FLUXES

Unique hydrazine-derivative fluxes for soldering copper to copper and copper to plated items. Excellent cleaning ability. Superior solder spread. Non-corrosive. Require no washing. Ideal for pre-dip work . . . you can pre-flux parts and store 'til ready for soldering.

R-SERIES FLUXES

Rosin base fluxes. Fine cleaning ability and solder spread. Non-corrosive.

Federated products:

Aluminum, Babbitts, Brass, Die Casting Metals, Fluxes, Lead and Lead Products, Magnesium, Plating Materials, Solders, Type Metals, Zinc Dust

employees in nearby areas. Once-a-month cleaning keeps the air filters in top shape.

After initial painting in the foundry, the castings move to the machine shop where they are machined to required specifications. They are then sent to the company's final erecting department.

Final painting is carried out in two 17 x 37 ft spray booths in the erecting shop. The castings are refilled after assembly and given two coats of finish paint prior to shipment.

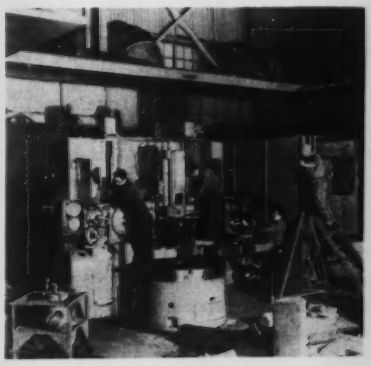
Booths can accommodate two medium sized vertical turret lathes at one time.

A crew of employees gives each machine a final cleaning prior to application of paint. Model 18 guns which draw the fluid from large drums and pressure tanks at the side of the booths are used.

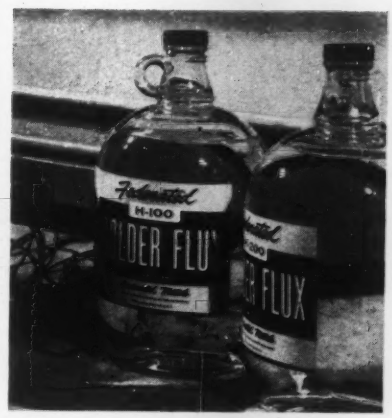
A 4-ft dry-bench-type booth in the shipping department is a separate part of Bullard's spray painting facilities. Operating in the same manner as the larger booths, it is used exclusively for spraying small parts ordered separately, either as new items or replacements.

Many of the guns and paint tanks have given good service for as long as ten years.

Binks equipment was originally installed in the Bullard plant in 1941. Since then, paint facilities have been supplemented and modified by enlarging the spray booths and moving them to strategical points.



After final assembly, machine tools receive finish coats in two 37 x 17 ft spray booths in the final erecting department. Large ducts at top of booth exhaust air to the outside after paint particles have been removed by air filters



COMPETITIVELY TESTED Federated Fluxes Save Trouble and Money

You can be sure that the Federated flux you buy has the best available combination of properties for the work it is to do. You can be sure that joints are chemically clean... that initial oxides are removed and further oxidation prevented during the soldering operation.

ASARCO's Central Research Laboratory checks production samples of Federated Fluxes against similar fluxes from competitive suppliers. Until laboratory tests prove that Federated products contain better properties, they are not approved for sale.

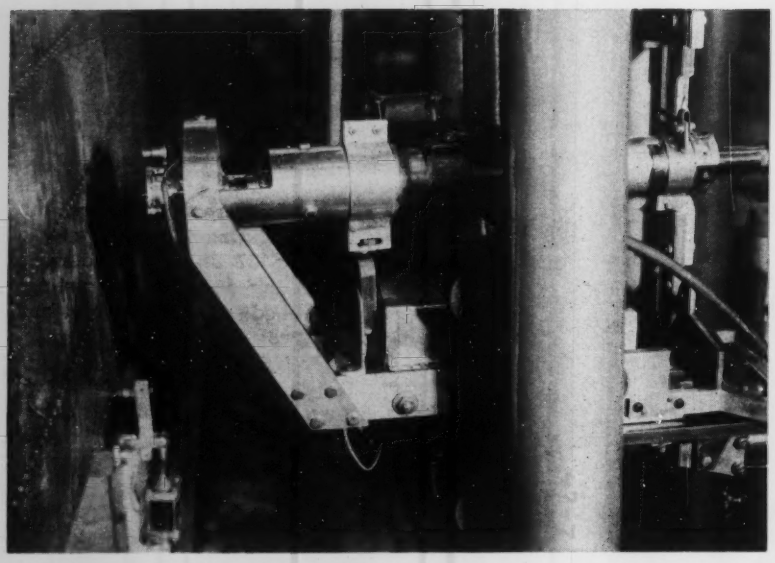
Federated Metals ASARCO

Division of

AMERICAN SMELTING AND REFINING COMPANY

120 Broadway • New York 5, N.Y.

In Canada: Federated Metals Canada, Ltd., Toronto and Montreal



Three limit switches (two show in the photo) are mounted at the working end of the drill to provide accuracy in operating the drill at exactly 90 degrees to the wing surface. Air pressure holds the drill against the skin

Countersink Built for Precision

Close-tolerance work on aircraft skin holes is boosted some 400 per cent by this custom machine. A team of limit switches controls the cutter

TAKE a standard air-feed drill. Place it in a housing which will give it universal maneuverability. Add a self-aligning device near the working end of the drill. Apply pneumatic pressure. And you have the new Martin development for countersinking.

The wing skin and fuselage of a high speed jet plane contain thousands of flush, flat-headed rivets and screws. Each hole must be countersunk to close tolerances. A bump that measures only a few thousandths of an inch makes a structure aerodynamically unsound at supersonic speeds. The countersink must be exactly perpendicular to the surface of the skin, and the depth of cut must be precise.

Gimballed — The self-aligning feature consists of a gimbal attached to a standard drill. It has a 6-in. metal ring and holder for the drill. Three limit switches, located in the nose of the drill holder, control a solenoid which actuates the on and off operations of the drill.

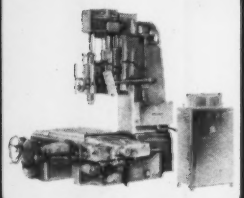
Operation—The operator moves a vertical handle actuating the air cylinder which presses the unit against the skin and moves the drill to a 90-degree normal position. The switches contact the skin during this operation and actuate the magnet and solenoid. All three switches must make contact. If one loses contact, the switch opens and stops the drill.

Under the thrust developed by the drill, when the proper depth has been reached, a pressure pad on the countersink forces the unit away from the skin, opening the switches and stopping the drill.

The old method of using a hand-operated drill took about 30 seconds a hole. The new method countersinks a more accurate hole in 7 seconds.

Because
"SEEING IS BELIEVING"
let this film show you how

THE
PRATT & WHITNEY
Electrolimit
JIG BORER



- INCREASES ACCURACY
- HELPS ELIMINATE COSTLY ERRORS
- IMPROVES WORK QUALITY

And
- REDUCES PRODUCTION COSTS IN THE TOOLROOM *AND ON THE PRODUCTION LINE!*

Arrange Now . . .
for a showing of the new 16 mm sound motion picture film in full color,
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Write on your company letterhead to Pratt & Whitney Company, Inc., 13 Charter Oak Blvd., West Hartford 1, Conn.

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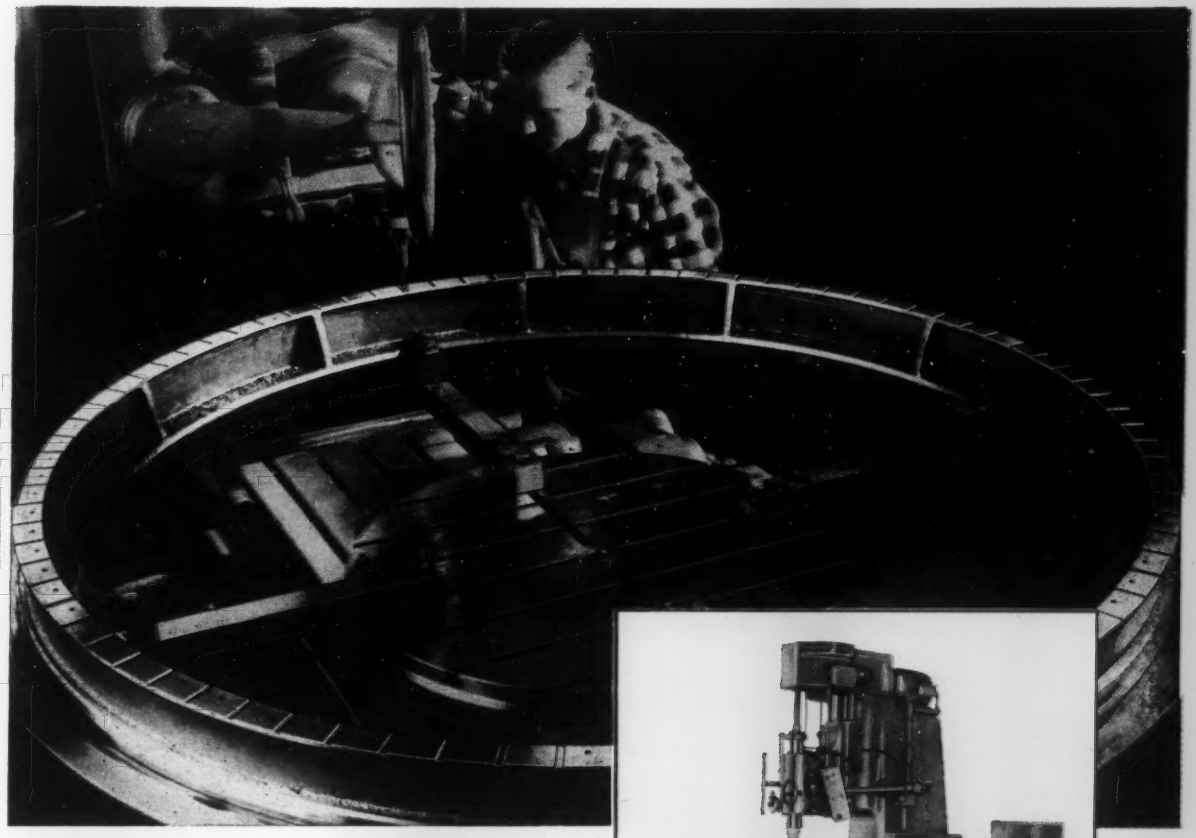
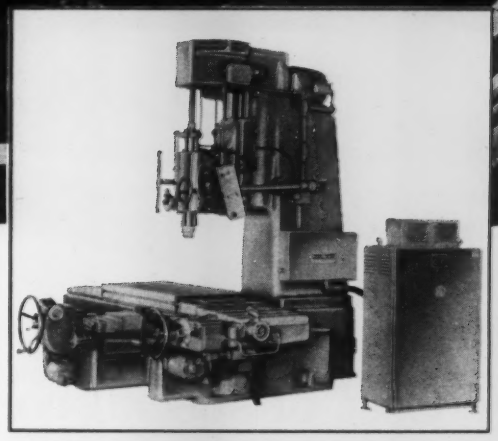




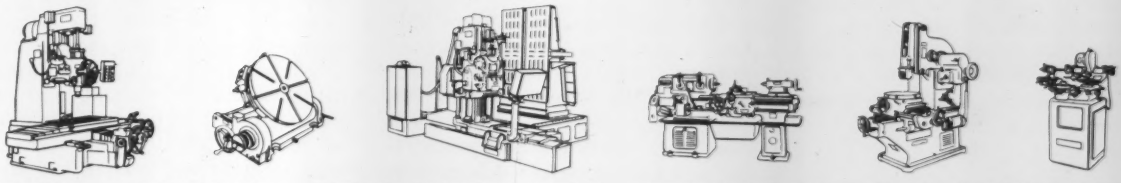
PRECISION plus BIG CAPACITY

P&W JIG BORERS WITH OPEN-SIDE CONSTRUCTION

Nearly 6 feet in diameter, the aircraft tooling fixture shown above was really big! It required machining 84 slots and boring 84 holes on the face and machining 84 slots on the flange. *All* 252 slots and holes had to be equally spaced and located within ± .001" of true radial. Handling jobs like this with ease and efficiency takes the combination of high precision and big work capacity you'll find only in a Pratt & Whitney Jig Borer with Open-Side Construction.

Pratt & Whitney Jig Borers – both Electrolimit and End-Measure types – are produced in complete lines for every work size requirement. All types and models will locate accurate to .0001" . . . and will retain this initial high precision and rigidity *indefinitely!* Get complete information now.

Write for your copy of Circular No. 587. Pratt & Whitney Company, Incorporated, 13 Charter Oak Boulevard, West Hartford 1, Connecticut.



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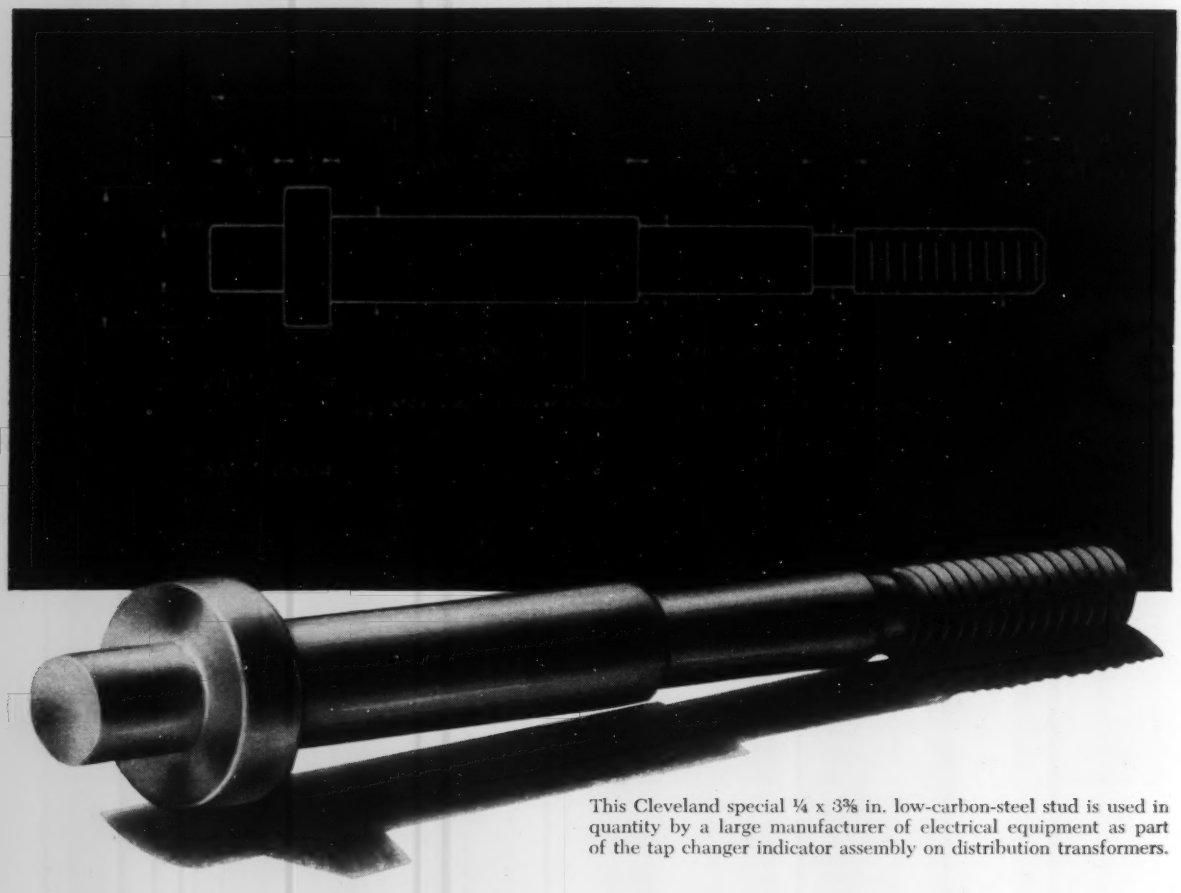
CLEVELAND SPECIAL HEADED AND THREADED PRODUCTS



This Cleveland special ¼ x 3⅜ in. low-carbon-steel stud is used in quantity by a large manufacturer of electrical equipment as part of the tap changer indicator assembly on distribution transformers.

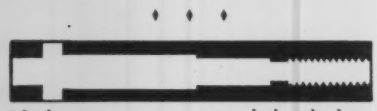
Cost of special collar stud is cut 20% by Cleveland's cold forming techniques

The famous Kaufman Double Extrusion Process which turns out millions of Cleveland precision cap screws yearly is highly adaptable to low-cost production of your fastener-type specials.

The tap changer stud pictured above is typical. Used by a well-known electrical equipment manufacturer, it was previously cut from bar stock. The special head, double shoulders, and groove above the threads meant numerous machining operations and considerable scrap.

Cleveland now cold forms this special stud at 20% less cost to the customer, while holding the specified .005 in. tolerance. And the part is stronger. In the head, threads and fillets, grain flow is symmetrical and unbroken. In addition, the forging action of the Kaufman process toughens surface metal while leaving the core ductile. Both fatigue resistance and tensile strength are thus increased.

We are regularly cold forming close-tolerance specials—many with unusual or extreme upsets—in large quantities. So whether your part is simple or complex, it will pay you to check with Cleveland, particularly at the design stage. There is an excellent chance that through cold forming we can cut the cost and improve the physical properties of the part you have in mind.



Black area represents metal that had to be cut away when stud was produced by machining. In the Cleveland cold forming process almost all the metal in the working slug is present in the finished part. The customer saves the difference.

Write for a copy of our folder "Specials by Specialists"

THE CLEVELAND CAP SCREW COMPANY
4444-2 Lee Road, Cleveland 28, Ohio

Air Maintenance

Care of air compressors and distribution systems is expensive. Here are some tips

GOOD maintenance is the key to the efficiency of compressed air systems. The Compressed Air & Gas Institute suggests that these points should be checked:

Maintenance begins before installation. A clean, dry area, with good ventilation, especially for air-cooled machines, and an easily accessible supply of cool, clean air for the compressor are necessary. Air lines must be large enough to insure proper pressure regulation (10 per cent is satisfactory). Circular lines and network systems insure maximum flow at any point in the system.

Adequate valving, including safety valves, is desirable so that any portion of the system can be isolated without affecting the operation of the balance.

To avoid changes and expensive operations after installation, the system must be maintained with permissible additions, alterations and adjustments.

See that the compressor and the area about it are clean. Routine maintenance will be easier if the machine is accessible to the service man.

The manufacturer of your air compressor mentions a number of items to be checked and serviced regularly in his service manual.

Routine—Set up an inspection procedure, with each item spelled out accurately. Also spell out who is responsible for each item. Once a routine is established, check it occasionally to see if it is adequate. Such inspection serves another purpose: Service men become familiar with the compressor and its operation.

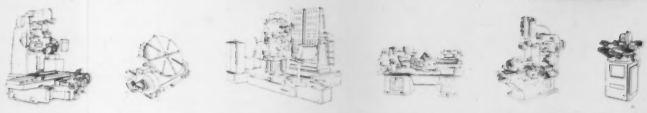
Overhauls should be scheduled to eliminate or minimize the possibility of breakdown. Several factors must be considered in deciding what must be done and how often—including inspection results, service factor, importance to the operation and availability of replacement.

Generally, it is better to overmaintain. Rush repairs are not

Numerical Control

A NEW APPROACH TO PRECISION IN PRODUCTION MANUFACTURING – "Numerical Control" is an automatic, ultra-precision means of translating blueprint data into machine positions and, other functions. Successfully applied to Pratt & Whitney high precision Jig Borers, Hole Grinders and Rotary Tables which are usually restricted to toolroom use, Numerical Control makes the superior accuracy of this equipment available for efficient long run or short run production work where extreme precision is essential. It provides automatic operation *without* complex, expensive tooling or investment in special "one-job" machines. Scrap losses due to human error are practically eliminated since the machine can be placed under the control of a tape program.

Write for more information.
Pratt & Whitney Company, Incorporated,
13 Charter Oak Blvd., West Hartford, Conn.



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Load Hoisting

Originator and leader in its class for 30 years, KRANE KAR goes ALL-HYDRAULIC. Affords amazing ease of handling... touch control of all crane operations . . . with other engineering advances that simplify operator's work . . . eliminating gear shifting and clutch replacements . . . cutting maintenance to the bone and setting new standards of efficiency and productivity. Get the details. ***Write, wire, telephone today.***

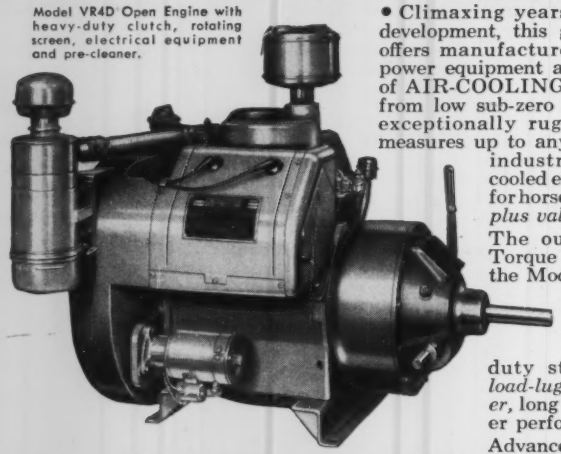
FLUID DRIVE POWER STEERING

MODELS 1000 TO 25,000 LBS. CAP.

SILENT HOIST & CRANE CO.
Pioneer Mfrs. of Heavy Duty Materials-Handling Equipment
849 63rd Street, Brooklyn 20, N. Y.

Introducing the NEW, BIGGER 56 HP.
Model VR4D WISCONSIN
HEAVY-DUTY *Air-Cooled* ENGINE...

Model VR4D Open Engine with heavy-duty clutch, rotating screen, electrical equipment and pre-cleaner.



• Climaxing years of engineering development, this great new engine offers manufacturers and users of power equipment all the advantages of AIR-COOLING, at temperatures from low sub-zero to 140° F., in an exceptionally rugged engine that measures up to any "heavyweight" industrial type liquid-cooled engine, horsepower for horsepower, with many *plus values.*

The outstanding High Torque characteristic of the Model VR4D engine, combined with its extremely rugged construction and heavy-duty stamina, provide *load-lugging holding power,* long life and top power performance.

Advanced "V" design provides an extremely compact power package, plus all traditional Wisconsin heavy-duty features such as tapered roller main bearings.

This new engine rounds out a complete line, comprising 15 models in 4-cycle single cylinder, 2- and 4-cylinder sizes, from 3 to 56 hp. Write for "Spec" Bulletin S-207.

WISCONSIN MOTOR CORPORATION
World's Largest Builders of Heavy-Duty Air-Cooled Engines
MILWAUKEE 46, WISCONSIN

A7-6092-⅓A3

usually of the highest quality, not to mention increased costs due to overtime.

Maintenance of the air distribution system is somewhat simpler than that of the air compressor but demands the same type of high standard work to insure trouble-free service.

Leakage—The entire compressed air system and the equipment it services must be regularly checked for leaks. Leaks discovered must be repaired immediately or before the next inspection. Although leak detection and repair are expensive and time consuming, they are justified by the reduced costs of power and the increased useful output of the air compressors.

Primary and secondary air receivers should be kept clean and dry inside. Condensate that is allowed to collect in receivers promotes pitting, corrosion and generally an early failure of the receiver.

Recommended: Automatic drains that are checked regularly (perhaps weekly). Receivers should be opened yearly and the interior inspected for carbon deposits, pitting, corrosion or any signs of reduction in structural strength. Defective receivers must be repaired or replaced without delay.

The safety valves of the air compressor and the distribution system deserve weekly attention to insure that they are in operating condition and of the proper size and setting for the job.

Free access to the compressor promotes good service when checking the unit for leakage

Handling Hot Rolls

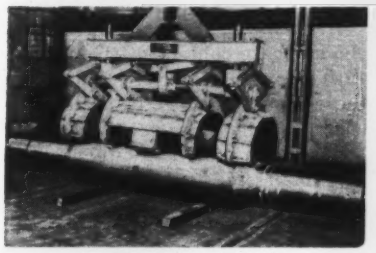
Tongs deliver them safely, quickly. Craneman controls locking, unlocking device

PIECES of hot metal sometimes pop off steel mill work rolls as they are moved from heat treating to stress relieving operations. This manufacturing hazard is caused by change in temperature.

To safeguard personnel, the Homestead Works of U.S. Steel Corp. uses special tongs, which carry the rolls safely and quickly.

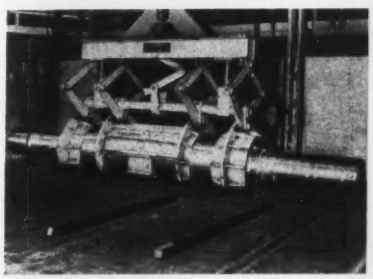
Safe—Made by Heppenstall Co., New Brighton, Pa., the tongs have four scissors-type jaws, suspended from a steel beam, with an automatic locking and unlocking device. The jaws enclose most of the body of the work roll, both in the center and at each end.

Another safety feature: All operations can be controlled by the craneman; personnel don't have to fasten chains or rigging.



TONG JAWS

. . . locked open (top) closed (bottom)



Operation — Tongs are lowered over a work roll, with their jaws locked open. When the craneman begins the lift, the action unlocks the mechanism. The jaws close around the roll and hold it firmly.

When the roll is delivered at its destination and again rests on a firm surface, the tongs are lowered a few extra inches; the jaws lock open again; and the load is released.

Higher Basic Standards of Accuracy

A NEW APPROACH TO LOWER-COST PRODUCTION

The product you manufacture may – or may not – require fine precision, in itself. In either case, higher basic standards of accuracy will make it possible for you to reduce production costs and speed up output. Precision standards will help you maintain the *correct* tolerances – broad or close – for your product, clearly define these tolerances for your operators, and insure work always within correct limits with minimum scrap losses. Accurate measurement will insure faster, lower-cost assembly and often eliminates expensive selective assembly.

The right means for establishing higher basic standards of accuracy in your plant may be just a set of precision gage blocks . . . or a fully-equipped "Standards Room." But whatever your needs, you can be sure of the finest when you select from Pratt & Whitney's complete line of Basic Measuring Equipment.

Write for complete information
Pratt & Whitney Company, Incorporated
13 Charter Oak Boulevard,
West Hartford, Connecticut

GAGE BLOCKS . . . STANDARD MEASURING MACHINES . . . SUPERMICROMETERS . . . COMPARATORS
CONVENTIONAL GAGES . . . THREAD COMPARATORS . . . AUTOMATION AND CONTINUOUS GAGES

PRATT & WHITNEY

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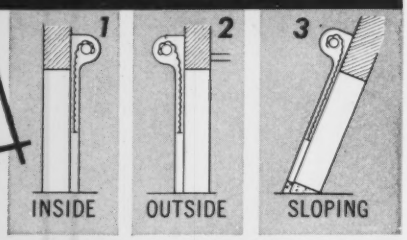
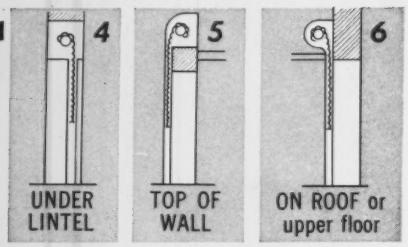
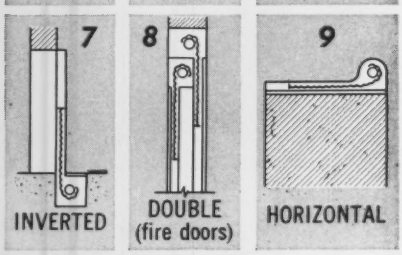
Quick Guide to Kinnear Door Versatility



Kinnear Steel Rolling Doors

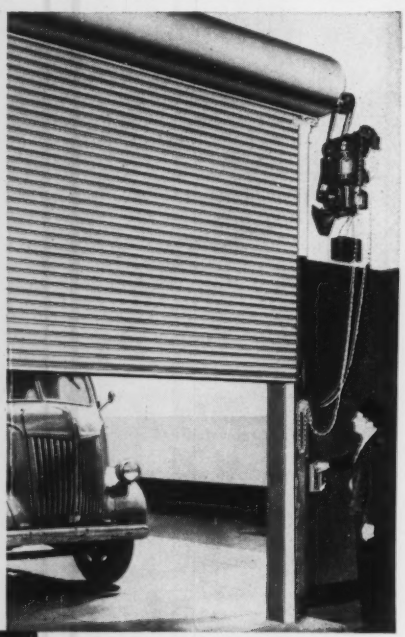




Whether your door needs are standard or special, Kinnear Rolling Doors offer you more efficiency *more different ways* than any other type of door. For example, the coiling upward action of Kinnear's interlocking steel curtain can be applied:

1. Mounted on inside wall; coils overhead.
2. On outside wall; leaves ceiling clear.
3. Sloping doorway (chutes, hoppers, etc.).
4. Hood under lintel or concealed in wall.
5. Hood above lintel or on top of wall.
6. Hood above roof or upper floor level.
7. Inverted mounting (coil below door sill).
8. Kinnear Rolling Doors (automatic fire type) on both sides of wall for maximum fire protection.
9. Horizontal mounting (openings for observatory, ventilator or similar eqpt.).

In *every* installation, Kinnear Rolling Doors open *out of the way* . . . need no usable space for either storage or operation . . . give extra protection against fire, theft, wind, weather or vandalism. Extra heavy galvanizing assures corrosion-free durability. Built any size. Motor or manual operation. Write for full information!



KINNEAR ROLLING DOORS
Saving Ways in Doorways

The KINNEAR Mfg. Co.
FACTORIES:
1780-1800 Fields Avenue, Columbus 16, Ohio
1742 Yosemite Ave., San Francisco 24, Calif.
Offices and Agents in All Principal Cities

Saves Chromic Acid

New liquid additive lowers operating costs of plating baths. Simplifies waste disposal

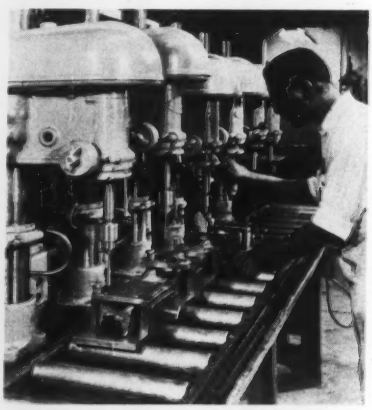
ADDITIONAL covering power, less waste of chromic acid, safer working conditions and reduced operating costs are said to be the chief advantages of a new liquid addition for chrome plating baths.

Called Krome-On, the light green liquid is saving users more than its initial cost in terms of chromic acid saved, says Wagner Bros. Inc., Detroit, developer of the agent.

Covers Better—When placed in a bath, it oxidizes into a complex mixture during electrolysis and gives the chrome bath additional covering power. It also reduces chromic acid waste by decreasing spray, dragout and flue loss.

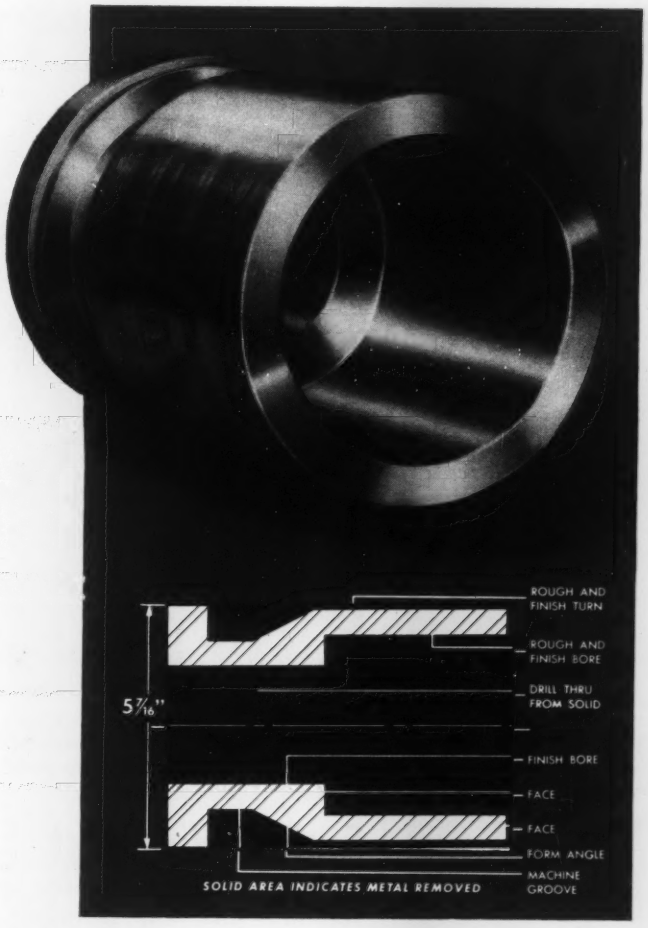
The bubble size of the hydrogen and oxygen liberated at the elecrodes, is kept to a minimum. This, Wagner says, decreases the amount of chromic acid expelled into the air and lessens the health hazard.

An additional advantage is that the sulphate content of the chrome bath is not altered in any way; the selected bath ratio is not disturbed. Other catalyst radicals, in combination with the sulphate, are also unaffected.



Rolling Table Eases Work

A conventional roller conveyor mounted on the table of a 6-spindle drill press at Arrow Tool Co. Inc., Wethersfield, Conn., helps the operator. He can move the 40-lb workpiece (it's 45 in. long) and 80-lb fixture from spindle to spindle with minimum effort. Workpiece and fixture "float" into proper alignment with each drill and counterbore



Let me show you how one of our P & J Automatics

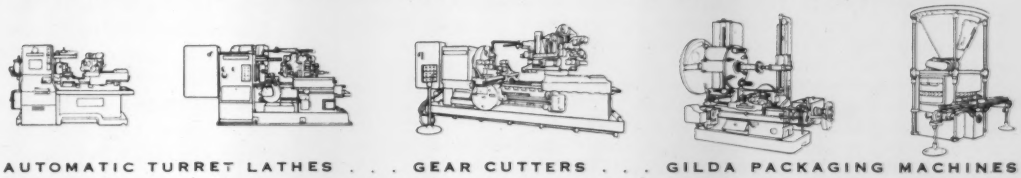
Hogged Out Over

31 POUNDS OF STEEL IN 6¾ MINUTES!

This job looked really tough. Machining from the solid meant unusually heavy metal removal . . . and our customer had to hold some pretty close tolerances and turn out parts *fast*! Here's what did the trick! Our new P&J Automatics have the extra power it takes to hog out metal fast *and* the extra rigidity that's needed to stay within the required limits under the heaviest feeds. You can see how teaming a machine like this with P&J Tooling, to save even more time by combining cuts, made it possible to complete one of these spools every 11 minutes. A new P&J Automatic can bring performance like this into your plant too. Send me your sample prints, and I'll show you how a P&J Automatic with P&J Tooling can help you turn out your toughest jobs faster, better and at lower cost. Write to Potter & Johnston Company, Pawtucket, Rhode Island.

HERE ARE THE FACTS:

PART: *Chuck Operating Spool.*
MATERIAL: *Cut-Off Bar Stock #34 Carbon Steel.*
REQUIRED: *Machine from the solid. Ten separate precision cuts.*
RESULTS: *A part completed every 11 minutes in a single, fully automatic cycle, removing a total of 40 pounds of metal.*
MACHINE: *P & J Model 6DRE-40.*

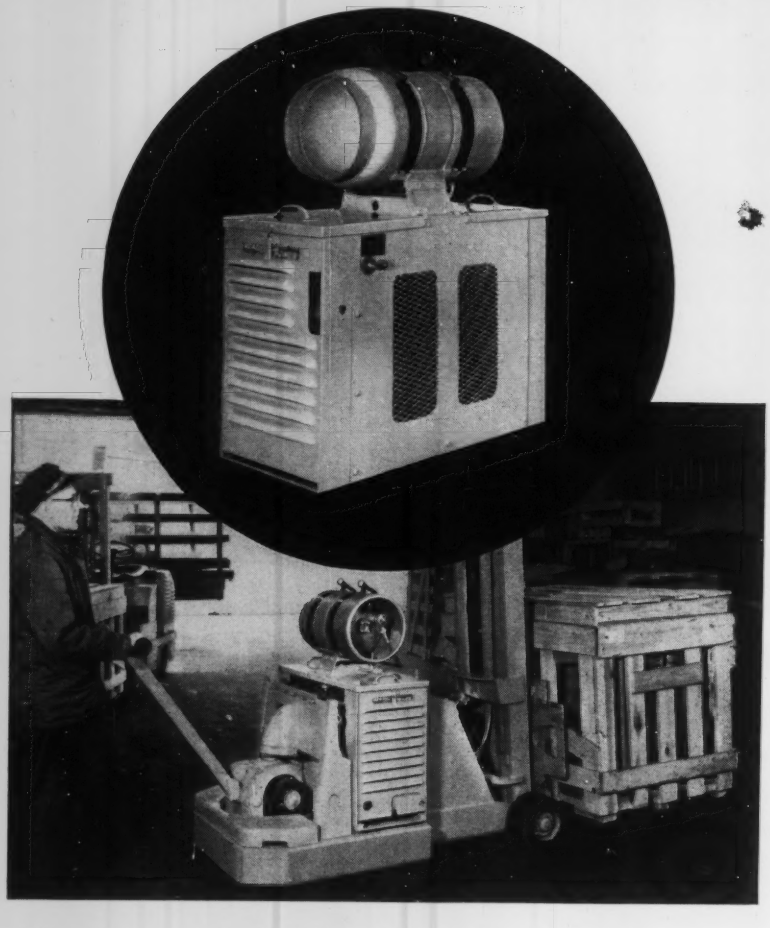


AUTOMATIC TURRET LATHES . . . GEAR CUTTERS . . . GILDA PACKAGING MACHINES

POTTER & JOHNSTON
SUBSIDIARY OF PRATT & WHITNEY COMPANY, INC.
PRECISION PRODUCTION TOOLING SINCE 1898

LPG-ELECTRIC

The Versatile READY-POWER way!



New! Bantam Model W12 for Electric Powerized Hand Trucks

Ready-Power combines full electric power *with no fatigue* AND the economy and low maintenance of LP-gas in one compact new power unit. Installation is quick and easy on any make of motorized electric hand truck with adequate sized power compartment. Bantam model W12 accommodates an interchangeable 20-pound fuel cylinder, includes a quick-disconnect fuel line coupling for safety, has removable end, side and cover plates for easy accessibility. LP-gas components are listed by Underwriters' Laboratories and comply with Factory Mutual recommendations. It's easy to convert your present trucks to this modern, full-production power. Specify "Ready-Power" when ordering new trucks. Write for information.

READY-POWER

The READY-POWER Co., 3824 GRAND RIVER AVE., DETROIT 8, MICH.

Manufacturers of Gas and Diesel Engine-Driven Generators and Air Conditioning Units; Gas and Diesel-Electic Power Units for Industrial Trucks

Test wire is clamped in fixed upper jaw (top) and movable jaw (bottom). Wire is twisted manually. The twist

Spring Wire Test

Torsion is said to be more useful than tensile stressing; it provides more adequate information

THE device in the picture determines the torsional elastic limit of spring wire.

Wire placed in it can be twisted a measured amount. When the permanent set is 2 per cent of the total twist, it is called the 2 per cent set point.

For the springmaker, such measurements are of far greater significance than tensile tests, says W. R. Johnson, metallurgist, Associated Spring Corp., Bristol, Conn.

Formula — Stress is computed from the formula: *Stress* (*psi*) *equals pi times the modulus of elasticity times the wire diameter* (*in.*) *times the deflection. That total is divided by*: 360 *times the length of the wire* (*in.*).

For steel wire, the stress is equal to 1000 times the deflection in degrees when the wire length is equal to 100 times its diameter.

Here is how the tester is used.

needed for permanent deformation of 2 per cent is a measurement of torsional yield point

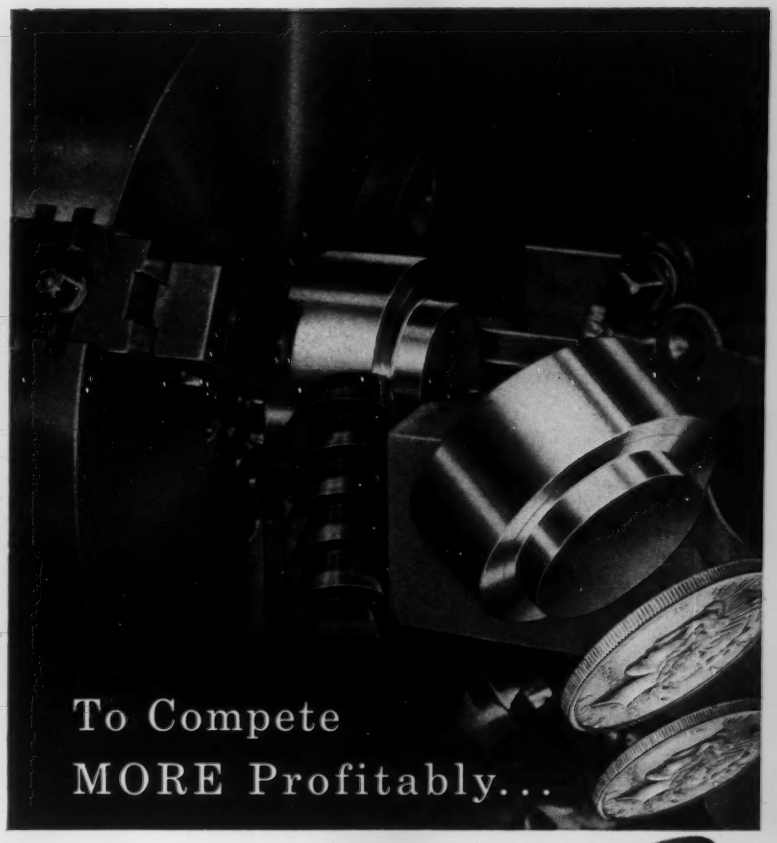
Select a sample which is slightly longer than 100 or 200 times the wire diameter. Bend the wire 90 degrees at each end. The portion between the bends should be 100 or 200 times the wire diameter. Clamp the sample in the tester.

Load is applied manually and released. The reading at no load gives the torsional set of the wire. Loading is applied repeatedly in progressively increasing amounts until the set exceeds 2 per cent of the largest (final) deflection in degrees.

Significance—The springmaker's most common measurement of quality is the tensile test. While it is easy to use, it is not adequate for predicting spring performance, says Mr. Johnson.

A helical compression spring is stressed in torsion. It can fail in service if the stress exceeds the torsional yield point. That value can be used directly in calculating the load a spring can safely carry without excessive set.

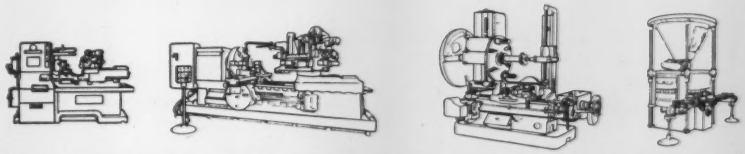
Mr. Johnson maintains that a tensile test cannot give such information accurately.



You MUST cut costs

Designed and built to hog out tough metals faster and to hold required tolerances while increasing output rates, Potter & Johnston Automatic Turret Lathes are your best bet for cutting production costs and gaining an effective advantage over competition.

You can't reduce wage scales, material costs, power rates or taxes . . . but you *can* investigate Potter & Johnston Automatics now. Teamed with time-saving P&J-Engineered Tooling, these machines have everything it takes to increase production, improve work quality, shorten machining time, and reduce costs by providing divided labor charges. Write today for complete information . . . there's a P&J Automatic for every work size requirement. Potter & Johnston Company, Pawtucket, Rhode Island.



AUTOMATIC TURRET LATHES . . . GEAR CUTTERS . . . GILDA PACKAGING MACHINES

P&J

POTTER & JOHNSTON

SUBSIDIARY OF PRATT & WHITNEY COMPANY, INC.

PRECISION PRODUCTION TOOLING SINCE 1898

Cores for gate valves weigh about 16 lb, are hardened in 15 seconds

CO_2 Hardens Cores in Production Runs

Stainless steel foundry finds process has these advantages: It simplifies scheduling, requires less storage space and makes it easy to turn out rush orders

IN LESS than two years, Cooper Alloy Corp., Hillside, N. J., has converted 50 per cent of its coreroom output to the CO_2 process.

Its big advantage, says the company, is the elimination of the cost and time involved in core baking.

Sand for the cores is mixed with sodium silicate. The CO_2 passing through the cores combines with the sodium silicate in a gel which forms around each sand grain and cements them together within a few seconds.

Experience—Cooper Alloy started experimenting with the process in September, 1955. The first cores made had friable surfaces and were hard to knock out of the castings.

Additions, such as silica flour, iron oxide and zinc oxide, were developed to make a tough skinned, durable core with long shelf life and comparatively easy shakeout. The sand used has an AFS fineness number of 70.

Sticking of sand in blow tubes was eliminated by using aluminum tubes.

Case History — The 4-in. gate valve pictured above is a standard item. Cores are blown, then gassed for about 15 seconds at 50 psi. They can be made continuously, and storing is required for only short periods. The coreroom can work as little as 1 hour ahead of the foundry.

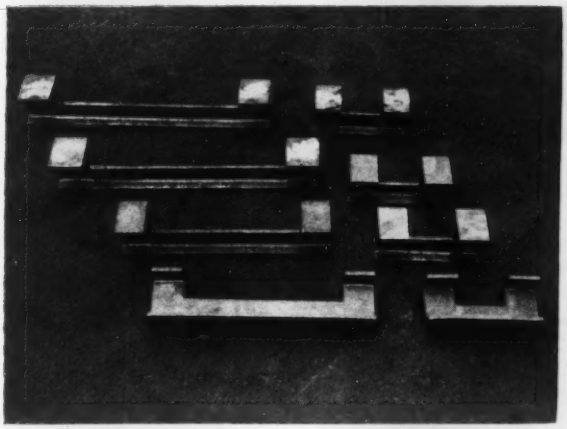
When the same cores were hardened by baking, the number blown at one time was limited by the number of dryers. When they were all in use, the run had to be stopped and another job set up on the blower. This made scheduling difficult and wasted productive time. Cores had to be stored until enough were made to run in the foundry.

Case History—The company received a rush order for 15,000 sup-

Corebox for gate valve uses two loose pieces

Time Comparison for 4-In. Gate Valve Core

Old Method	With CO_2
1. Made in halves.	1. Blown whole.
2. Dried in oven.	2. Glassed.
3. Pasted.	3. Ready for molds.
4. Coated.	
5. Dried.	
6. Ready for molds.	
Time: About 8 minutes.	**Time: About 2 minutes.**



15,000 of these parts were made in half the time with CO_2

Four of these cores are blown and hardened in 90 seconds

port feet for chemical tanks (shown above). Box-shaped cores with a vertical taper from the top to a wider bottom surface were needed to make the level surfaces required.

Cope and drag parts of the corebox were made so that four cores can be made at a time. Four drag sections are used with the cope section which is permanently attached to the blower. After the cores are blown, they are passed along to a gassing machine—the operation takes about 15 seconds at 50 psi. An automatic switch cuts off the flow of CO_2. Vents in core plates let excess gas out.

Without CO_2, baking periods of 4 to 6 hours would have been required. Also eliminated: Cleaning and coating and a large investment in dryers.

More Advantages—By hardening a large percentage of cores with CO_2, the company has freed its core ovens for short runs or unusual shaped cores that are not practical to harden with the gas.

Experiments have shown that cores can be stored for three months with no deterioration.

What's Needed—Equipment, says Cooper Alloy, is simple and inexpensive—a gas cylinder, gas flow regulator, rubber tubing and a length of ¼-in. pipe. Mass production gassing requires the addition of an electrical timer and solenoid valves.

Tentative cost figures show CO_2 sand mixes are 1½ to 2 times more expensive that oil sand mixes. Savings come from the elimination of operations (see box above).

FLEXIBLE DESIGN

CUTTING ACCURACY

CONTINUOUS FEED

RUGGED CONSTRUCTION

Automatic Shears

BY

HALLDEN

THE SHEARING SPECIALISTS

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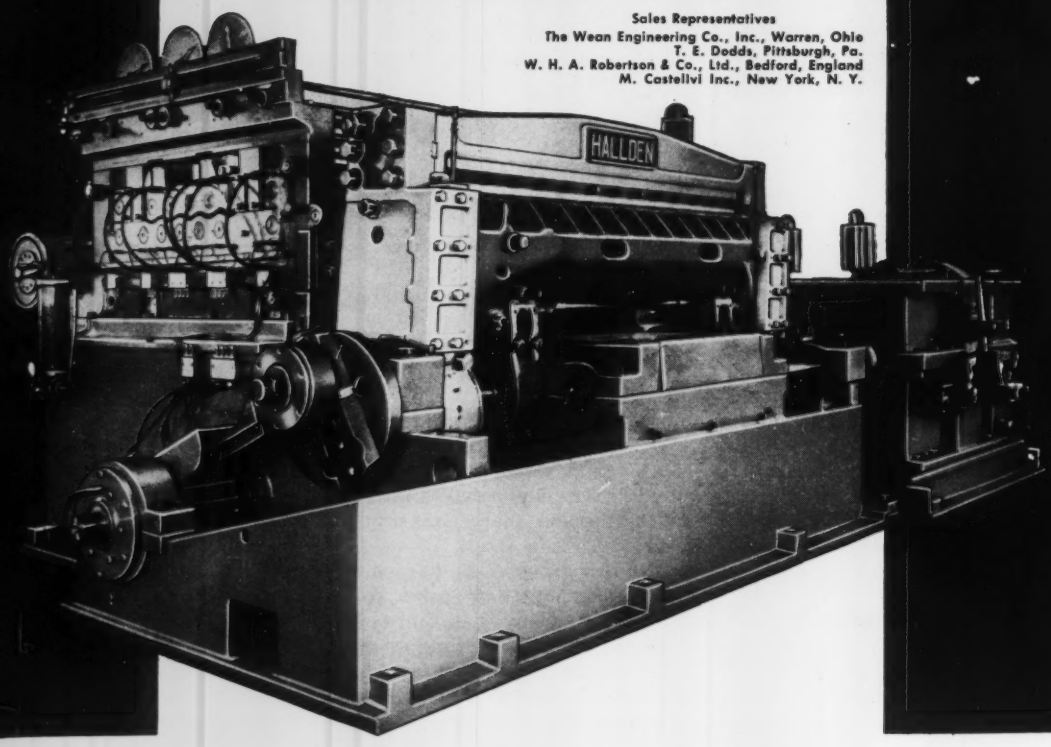
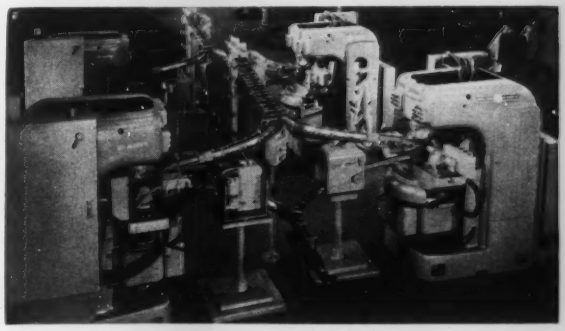


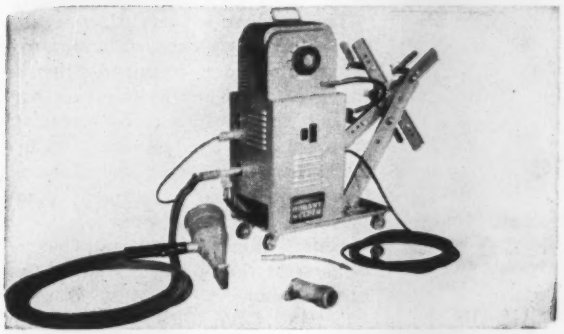
System Integrates Gear Shaving and Inspection Units

This system completely integrates the feed and control functions of four Red Ring gear shaving machines and automatically inspects all finish-shaved gears. It is adaptable to a variety of cluster-type gears having two or more gears on a part. It uses curved inclined feed chutes and motorized vertical chain conveyors that act as storage devices.

Pushbutton controls are provided for each machine, gage and chain conveyor. This enables each unit to operate independently for setup or emergency purposes. *Write*: National Broach & Machine Co., 5600 St. Jean Ave., Detroit 13, Mich. *Phone*: Walnut 1-8980



Semiautomatic Welder Is Light and Compact



This submerged arc unit is equipped with all controls and power cable for plugging in on 110 volt, ac or dc, wire reel, caster mounted base and carrying handles. A gun cable assembly is included with two welding guns—one flux type with hopper and one open arc type for welding without flux.

The head can be taken off the base by removing two screws on either side, making it easy to take the basic unit into cramped quarters or through manholes. The unit is designed for use with any arc welder having continuous current up to 500 amp. using solid wires and tubular wires. *Write*: Hobart Bros. Co., Troy, Ohio. *Phone*: 2-1223

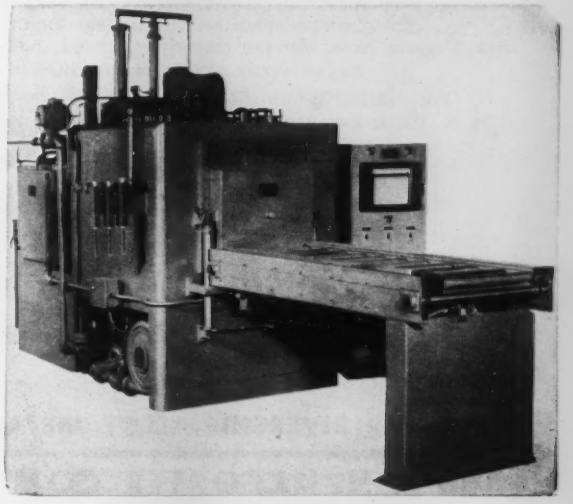
Heat Treat System Has Controlled Atmosphere

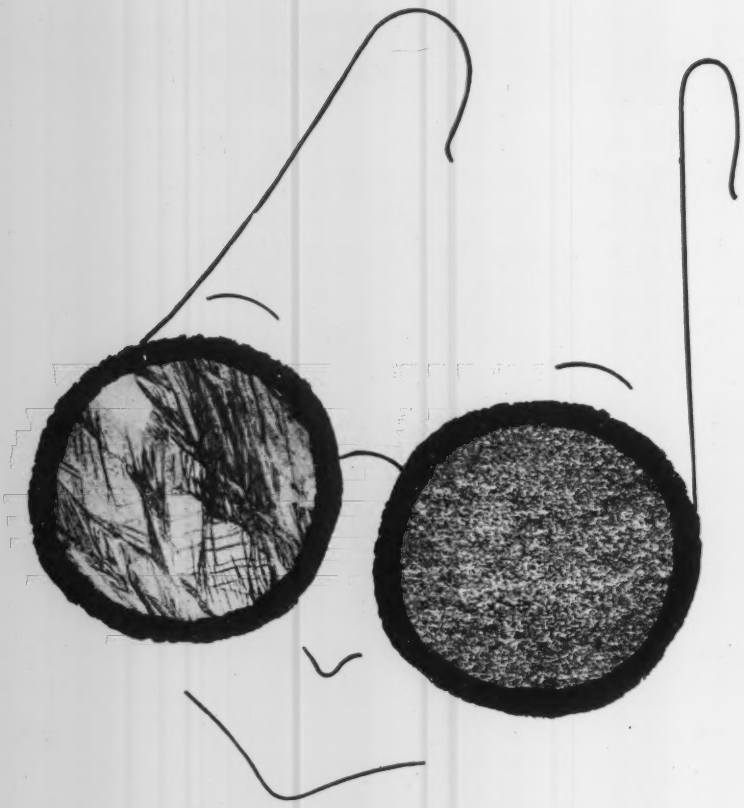
The Clean-Line system can be supplied as a package installation with matching combination heat treat furnace and quench tank, endothermic generator, tempering unit and automatic washer.

The basic unit is the automatically controlled atmosphere furnace for clean hardening, carbonitriding, carburizing, carbon restoration and annealing to a maximum of 1850°F. A power pusher moves the work into the heating chamber and another pusher head transfers work to the rack in the quenching chamber.

Quenching is automatic; the rack is raised and lowered by a pneumatic cylinder. The furnace is fired by eight gas burners of the vertical type. Quenching and heat treating chambers are separated by an alloy refractory lined intermediate door.

Work areas of the heat chamber and the quench rack are 24 x 36 x 18 in. *Write*: Eclipse Fuel Engineering Co., Rockford, Ill. *Phone*: 8-3751





You can see the difference

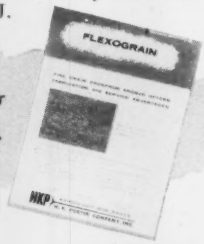
. . . not with the naked eye, we'll admit . . . nor even with bifocals, but put a polished and etched sample of our new FLEXOGRAIN phosphor bronze under the revealing eye of the microscope and compare it with phosphor bronze strip generally available.

The scientifically controlled, fine grain structure of FLEXOGRAIN is great for severe bending and other complex forming operations . . . improves fatigue resistance, surface finish and ductility . . . and cuts costly fabrication rejects to a minimum.

At Riverside-Alloy we have always been keenly aware of the importance of grain size control in determining functional and fabrication properties of our alloys. We have been supplying fine grain phosphor bronze strip for special applications for over 20 years. Now, with our recently expanded, modern facilities, we can supply production quantities to meet your needs.

For detailed information write to Riverside-Alloy Metal Division, H. K. Porter Company, Inc., Riverside, N. J.

Send today for Technical Bulletin T-4.



ALLOY METAL WIRE
Prospect Park, Pa.

RIVERSIDE METAL
Riverside, N.J.

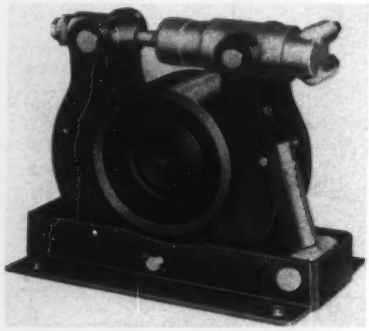
PRENTISS WIRE MILLS
Holyoke, Mass.

HKP RIVERSIDE-ALLOY METAL DIVISION
H. K. PORTER COMPANY, INC.

NEW PRODUCTS and equipment

Hydraulic Brake

This 3 x 6 in. unit is designed to provide smooth, powerful service braking and accurate load spotting control on light industrial cranes. It also is suited for tension control on mill roll stands and emergency stopping, holding and service braking on many machines.



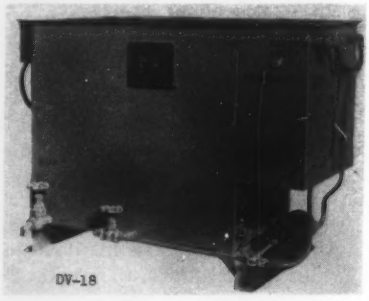
The hydraulic actuating cylinder is operated through a manual control cylinder equipped with a foot pedal. The brake arms are forced apart by a compression spring inside the actuating cylinder when the pressure is released. One-point brake adjustment compensates for lining wear.

Extra thick, nonscoring blocks of molded lining are bolted to the brake shoes. *Write*: Wagner Electric Corp., 6400 Plymouth Ave., St. Louis 14, Mo. *Phone*: Parkview 1-5000

Ultrasonic Degreaser

This compact bench model duplicate of large ultrasonic degreasers can be used in engineering institutions, colleges, testing laboratories and in continuous production work.

It thoroughly cleans such parts as ball bearings, watch and instru-



ment parts, tools and dies and hydraulic valves. Work area is 9 x 9 x 6 in. with a capacity of 100 lb an hour.

The DV-18 machine comes complete with all accessory equipment to insure precision work. *Write*: Ramco Equipment Co., division of Randall Mfg. Co. Inc., 1373 Lafayette Ave., New York 59, N. Y. *Phone*: Dayton 3-3900

Vibrating Conveyor

The low-headroom unit (it is only 4½-in. high) is well suited for removing scrap from under lathes, punch presses and milling machines.

The trough vibrates on low, maintenance-free Neoprene springs. Easy to install where space is limited, the units can be fitted with

drains for easy coolant collection and removal. The one-piece metal trough resists abrasion and wear but prevents scrap spillage.

The simple mechanical drive is easy to maintain. *Write*: Carrier Conveyor Corp., 190 N. Jackson St., Louisville 2, Ky. *Phone*: Juniper 7-9231

Corrosion Resistant Fans

The Type FG line of exhausters has excellent chemical resistance to a wide variety of acids, salts, gases, organic materials and other corrosives at temperatures up to 225°F. The impact resistant, resin bonded, glass fiber units will not support combustion.

The glass fiber housing has integral stainless steel studs molded in for attachment to the bearing

For easy, economical machine shop cutting use one of these 8 sturdy

DISSTON
HACK SAW BLADES

They cut easily...resist wear and breakage. Get them through your industrial distributor.

Write for latest folder and hack saw selector today.
Henry Disston Division
H. K. Porter Company, Inc.
Philadelphia 35, Pa.

HKP Henry DISSTON DIVISION
H. K. PORTER COMPANY, INC.

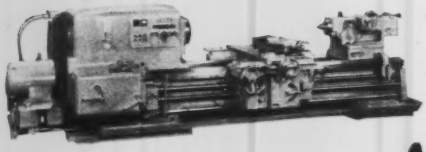
said the chip...

"I do a tale unfold"

This lathe chip, like many, many others, will go to the scrap pile. But there can be gold in the story that it tells.

Its color, size and shape pose questions like these: Is too much heat being generated by excessive speed, thereby causing short tool life and work distortion? Is speed too low, with resultant production loss? Is the rated horsepower of the machine too low or possibly too high for the expected metal removal? Is work finish unsatisfactory? Compressed into one overall question, is the inbuilt productiveness of the machine being realized on every cut of every part, day after day?

There's one certain, affirmative answer. Use Monarch's ultra-modern lathes—the Series 62 Preselector Dyna-Shift; the Series 80 and 90 Heavy Duty Dyna-Shift; the Series EE Model 1000. Chips from them are daily unfolding tales of increased output and lengthened tool life. It's quite possible the lathe chips in *your plant* would tell a story of real cost reduction, if "Made By Monarch". *The Monarch Machine Tool Company, Sidney, Ohio.*



You've never seen another machine like the Monarch Dyna-Shift Lathes with their "thinking headstocks." The Series 90 (above) is typical of a complete range of sizes featuring the Dyna-Shift way to reduced turning costs.

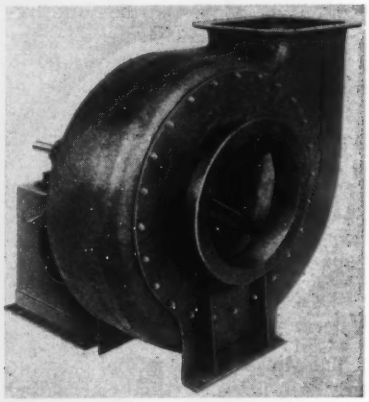
Monarch

ACCURACY • ECONOMY • LONG LIFE

TURNING MACHINES

FOR A GOOD TURN FASTER . . . TURN TO MONARCH

NEW PRODUCTS and equipment

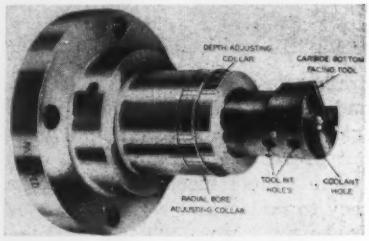


stand. The rotor is a balanced steel wheel with all exposed parts encased in thick glass fiber.

FG fume fans are available in standard capacities up to 34,000 cfm at static pressures up to 10 in. *Write*: Buffalo Forge Co., 490 Broadway, Buffalo, N. Y. *Phone*: Cleveland 4567

Adjustable Boring Head

Positive size bore and depth control are combined in this tool. Design makes it possible to adjust the tool to a tolerance of 0.0001 in. without loosening or tightening any screws. The calibrating collars are turned with a spanner wrench.



The boring head assembly is sealed against coolant and foreign particle infiltration. Coolants can be applied to the work directly from the machine spindle through the boring bar. *Write*: Briney Mfg. Co., P. O. Box 2208, Pontiac, Mich. *Phone*: Federal 4-2552

Aluminum Safety Hat

Ribbed for maximum blow resistance, this headgear is adjustable within the 6⅝ to 8 size range. The polyethylene head suspension is mildew, mold and fungus proof,

Pick exactly the right steel for any job from J & L's complete cold finished line

steel whorl production increased 22% with J & L LEADED STEEL

Superior uniformity and machinability of J & L 1113 Leaded Steel enabled this manufacturer to increase production from 110 to 140 pieces per hour. J & L Leaded Steels give you higher cutting speeds, longer tool life, improved finishes. Call your local distributor or write to Jones & Laughlin, 3 Gateway Center, Pittsburgh 30, Pennsylvania.

J&L STEEL

Jones & Laughlin

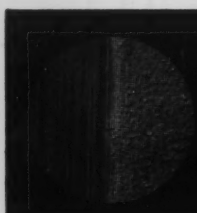
. . . a great name in steel

MACHINING PERFECTION always starts with the right steel

SMOOTH
but plenty tough!

WENDT-SONIS tools cut fast and clean . . . stay sharp

The difference is in the finish!
All Wendt-Sonis drills, reamers, counterbores and other round tools are 30% smoother by profilometer readings. Flo-Finish, an extra operation applied after final grinding, practically eliminates grinding marks.



30% smoother Flo-Finish reduces chip friction — permits faster chip flow away from cutting edges — faster feeds and speeds. Lower chip friction also means less tool-damaging heat with a resulting increase in tool life. In addition, less power is required, and work finish is improved — in some cases by an average of 50%.

Micro-photograph (right side) shows how Flo-Finish eliminates grinding marks.

For detailed information on Wendt-Sonis tools, for competent technical assistance on tooling problems, see your Wendt-Sonis distributor's salesman.

Send for free 94-page Catalog No. 55 — Address Dept. SM-557

WENDT-SONIS COMPANY

Hannibal, Missouri • Rogers, Arkansas

NEW PRODUCTS and equipment

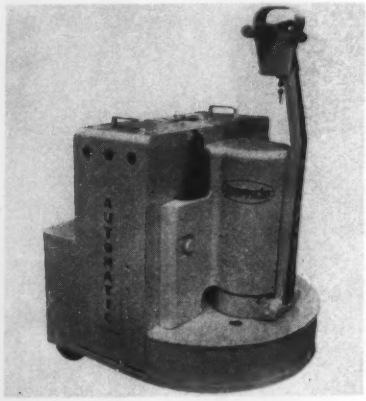
doesn't mat up with grease and oil and is easily cleaned.

Aluminum repels heat in hot weather. Half-liners for cool weather and full liners for cold weather are available. *Write*: Safety Division, Boyer-Campbell Co., 6540 St. Antoine, Detroit 2, Mich. *Phone*: Trinity 5-8500

Operator-Led Trucks

Models WT-2A and 4A are only 35½-in. long, 3¼-in. shorter than previous models of the same capacity.

The WT-2A draw bar pull is rated at 200 lb with an ultimate of 700 lb. The WT-4A has a normal draw bar pull of 400 lb with an ultimate of 700 lb. The normal ratings are double what they were.



Shorter length was made possible by use of a new all-gear power unit. The truck can make a U-turn in a 4-ft aisle. *Write*: Automatic Transportation Co., 149 W. 87th St., Chicago 20, Ill. *Phone*: Radcliffe 3-7000

Calibrating Press

The new Hart hydraulic is designed for calibrating dynamometers and similar compression tests where it is necessary to accurately measure forces up to about 66,000 lb. Properly calibrated, the press can reproduce measurements with an accuracy of better than 1 in 10,000.

The design incorporates a stationary plunger which is ground and lapped to fit a cylinder. The plunger has a bore hole from end

Dirt, Corrosion, Low Voltage Problems?

the answer:

Allis-Chalmers "dc operated" ac contactors*

Allis-Chalmers Size 6 starter, NEMA 1 enclosure.

Dc operators in Allis-Chalmers control assure dependable performance because they are not affected by dirt or corrosion on the armature face. Positive magnetic operation reduces contact pitting — eliminates hum and chatter—prolongs mechanical life. The operator picks up at 65% of rated voltage — holds in with as little as 35%.

For Any Low Voltage, High Horsepower Application . . . Allis-Chalmers Modern Control — Sizes 4, 5 and 6

Advanced Electrical Design

ACBO arc-centering blowout sharply curtails arcing time, greatly prolongs contact and chute life — without blowout coils.

Simplified Mechanical Design

Streamlined clapper-type construction permits natural arc rise in arc chute. Sensible enclosure dimensions provide ample wiring space. Easy accessibility simplifies maintenance.

For detailed information on this complete line of modern control, call your A-C Control Distributor or A-C District Office. Or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

*Self-contained ac to dc circuit. Standard in Size 6, optional in sizes 4 and 5.

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

A5372

ACBO is an Allis-Chalmers trademark.

Why NEW "150" HYDROHONER Is Economical . . . Compact . . . Standardized

Basic Micromatic "150" Machine, suitable for both internal and external Microhoning.

Now, even manufacturers with limited capital can afford Microhoning . . . with all its benefits including efficient stock removal, accurate geometry and controlled surface finish. The new Micromatic "150" Hydrohoner is the answer!

Because it is standardized and produced in quantity, this quality machine is economical. (Special engineering is limited to tooling and fixturing.) The design and quality of the "150" assures performance equal to more expensive honing machines. It has a 12″ stroke and Microhones diameters up to 1½″ . . . yet requires just 34″ x 52″ of floor space.

The Micromatic "150" is ideal for the manufacturer with limited capital, short production runs or a need for standby equipment. Immediate delivery from stock on basic machines.

The principles and application of Microhoning are explained in a 30-minute, 16mm, sound movie, "Progress in Precision" . . . available at your request.

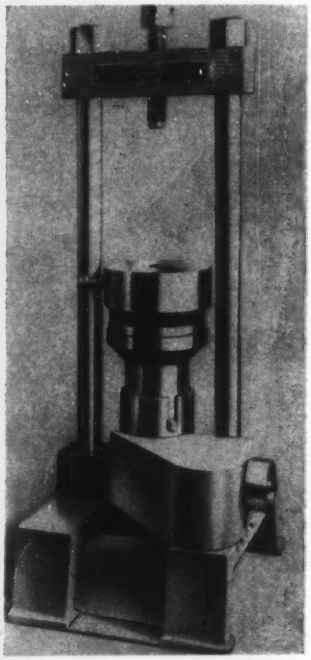
☐ Please send me "Progress in Precision" in time for showing on_____(date).
☐ Please have a Micromatic Field Engineer call.
☐ Please send Microhoning literature and case histories.

NAME_____
TITLE_____
COMPANY_____
STREET_____
CITY_____ ZONE_____ STATE_____ E

MICROMATIC HONE CORP.
8100 SCHOOLCRAFT AVENUE · DETROIT 38, MICHIGAN

NEW PRODUCTS and equipment

to end through which high pressure oil is forced from a pressure bench. This causes the cylinder to rise. To minimize friction, the pressure cylinder is rotated above critical velocity when measurements are being taken.



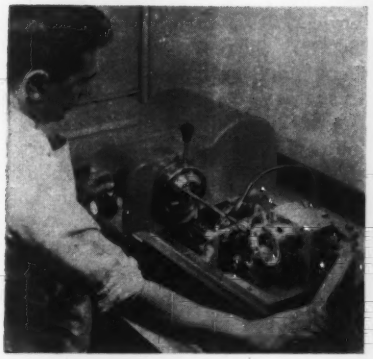
Around the pressure cylinder is a second cylinder which is connected to a motor to provide rotation. *Write*: Instruments Division, Phillips Electronics Inc., 750 S. Fulton Ave., Mt. Vernon, N. Y. *Phone*: Mount Vernon 4-4500

Turret Lathe

The Cem-Way No. 00 lathe is intended for secondary operations. It relieves larger equipment, eliminates re-setup time and allows final operations to be done by unskilled personnel.

A single synchronized, cam actuating lever locks the workpiece into position ready for any of eight operations. The lathe will center, cut off, spot face, drill, thread, turn, form, chamfer and pinpoint round workpieces up to ⅝-in. in diameter. It will hold concentricity to within 0.0003 in.

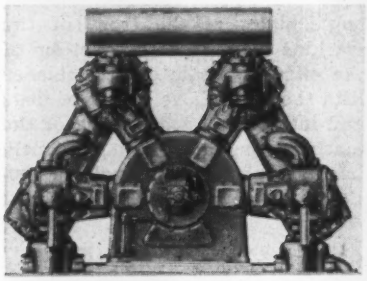
The unit can be equipped with a one or two-speed motor to pro-



vide three or six spindle speeds. It is constructed of close-grain semisteel castings and has heavy holddown lugs for bench mounting. *Write*: Cem-Way Sales Co., Box 99, Bristol, Wis.

Air Compressors

The output of the WN-224 compressor at 80 to 125 psi at gage is rated at 2418 to 6048 cfm, depending upon motor horsepower.



The 4-cylinder, double-acting compressor achieves final pressure in two stages.

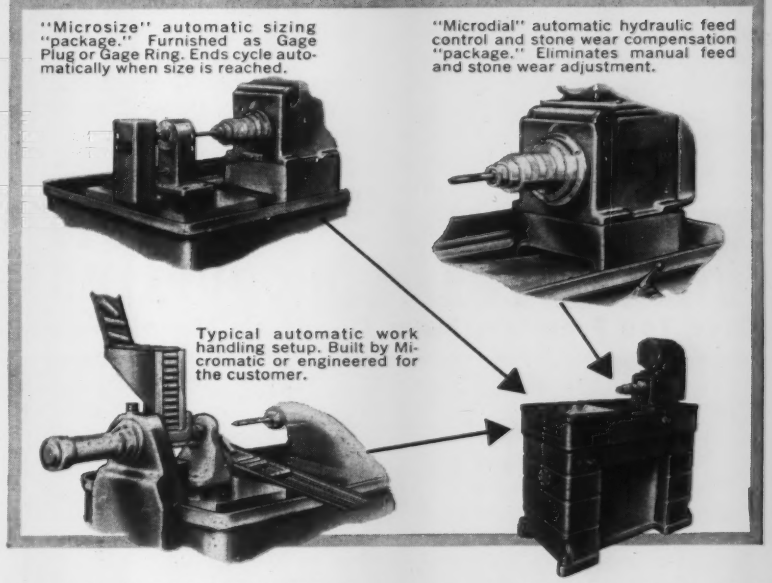
Three standard single models and three twin unit models are available. Twin units consist of two compressors powered by one motor. High and low pressure variations of the compressor are offered. Drive may be by electric motor, diesel engine, steam turbine or turboelectric. *Write*: Joy Mfg. Co., Oliver Bldg., Pittsburgh, Pa. *Phone*: Grant 1-2140

End Mill Driver

This unit offers a new concept in end mill cutting; many disadvantages of conventional milling are eliminated.

The end mill driver can be offset to produce an orbital motion of

How NEW "150" HYDROHONER Can Be Automated to Any Degree . . . Easily . . . Economically


"Microsize" automatic sizing "package." Furnished as Gage Plug or Gage Ring. Ends cycle automatically when size is reached.
"Microdial" automatic hydraulic feed control and stone wear compensation "package." Eliminates manual feed and stone wear adjustment.
Typical automatic work handling setup. Built by Micromatic or engineered for the customer.

The basic Model "150" Hydrohoner is a new, standardized and economical Microhoning machine . . . priced for manufacturers with limited capital or relatively short production runs.

The basic machine features automatic stroking and hydraulic initial tool expansion and collapse. Various degrees of automation can be easily added at any time to the basic machine as required by individual manufacturers' needs. Micromatic "package units" which provide specific automation functions are illustrated. Design of this basic horizontal machine and its stationary bridge facilitate addition of these "package units". For complete automation of the "150" Hydrohoner, Micromatic will build automatic work handling devices or assist users in designing their own automation of work handling.

Send coupon for complete information.

Learn how Microhoning will give efficient stock removal, closer tolerances, accurate alignment and functional surfaces.

☐ Please have a Micromatic Field Engineer call.
☐ Please send Micromatic literature and case histories.

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COMPANY_____

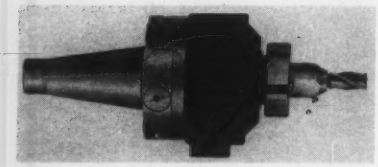
STREET_____

CITY_____ ZONE_____ STATE_____ E

MICROMATIC HONE CORP.
8100 SCHOOLCRAFT AVENUE • DETROIT 38, MICHIGAN

the cutting tool. This permits one-pass cutting of keyways with undersize end mills and partially eliminates the need for special diameter sizes.

The orbital motion also increases chip clearance, insures square slots and permits milling true-to-centerline on keyways. The driver has a 4 to 1 speed ratio between the spindle and the cutter.



The unit will accommodate 3/8 to 1 in. end mill shanks. The eccentric micrometer positioning range is 0 to 0.062 in. offcenter. *Write*: Portage Double-Quick Inc., 1049 Sweitzer Ave., Akron 11, O. *Phone*: Portage 2-7425

Rubber Cup Packing

Houghton 3081 packings are recommended for air, water and oil service at temperatures up to 250°F. Their resilience gives them quick response to activating pressures.

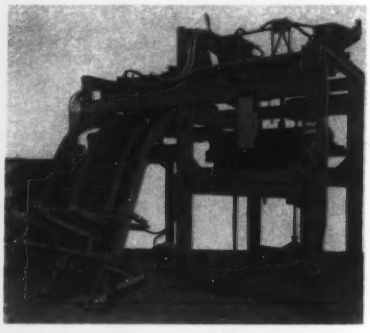
A special, high density synthetic rubber completely covers the fabric layers in the packing. The rubber takes the wear; the fabric does the reinforcing.

The packing is treated with a silicone lubricant to assure easy installation and break-in. It is available in standard sizes up to 6¾-in. OD and is preshaped to prevent distortion under pressure. *Write*: E. F. Houghton & Co., Philadelphia 33, Pa. *Phone*: Regent 9-7100

Automatic Bar Stacker

This unit handles tubes or bars from a cutoff machine and stacks them in a storage rack, ready for delivery to the assembly line.

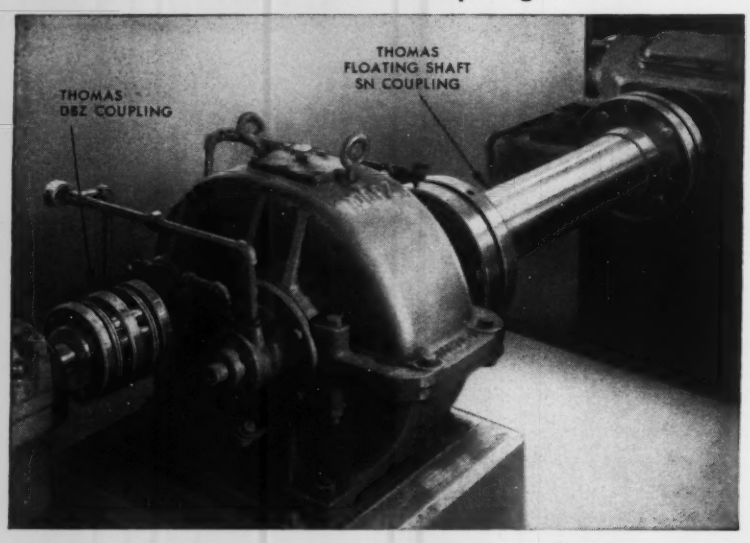
As the tube is released, the two angle slides at the front of the machine direct it to the bottom of the slide. A pair of steel blades lifts the tube above a pair of dogs and into the curved portion of the machine—pushing the previously handled tubes up the inclined section to form a magazine fill.



The layer of tubes is pushed up the curved section to the top of the machine. They are lifted by a grab, transferred horizontally to the storage rack and deposited. The overhead carriage returns to await a new magazine fill. *Write*: Spurgeon Co., 23501 Hoover Rd., Van Dyke, Mich. *Phone*: Jefferson 6-6250

THOMAS FLEXIBLE COUPLINGS

Give You Freedom From Coupling Maintenance



NO LUBRICATION **NO MAINTENANCE** **NO WEARING PARTS**

Future maintenance costs and shutdowns are eliminated when you install Thomas Flexible Couplings. These all-metal couplings are open for inspection while running.

They will protect your equipment and extend the life of your machines.

Properly installed and operated within rated conditions, Thomas Couplings should last a lifetime.

Under Load and Misalignment only Thomas Flexible Couplings offer all these advantages:

1 Freedom from Backlash Torsional Rigidity
2 Free End Float
3 Smooth Continuous Drive with Constant Rotational Velocity
4 Visual Inspection While in Operation
5 Original Balance for Life
6 No Lubrication
7 No Wearing Parts
8 No Maintenance

Write for Engineering Catalog 51A

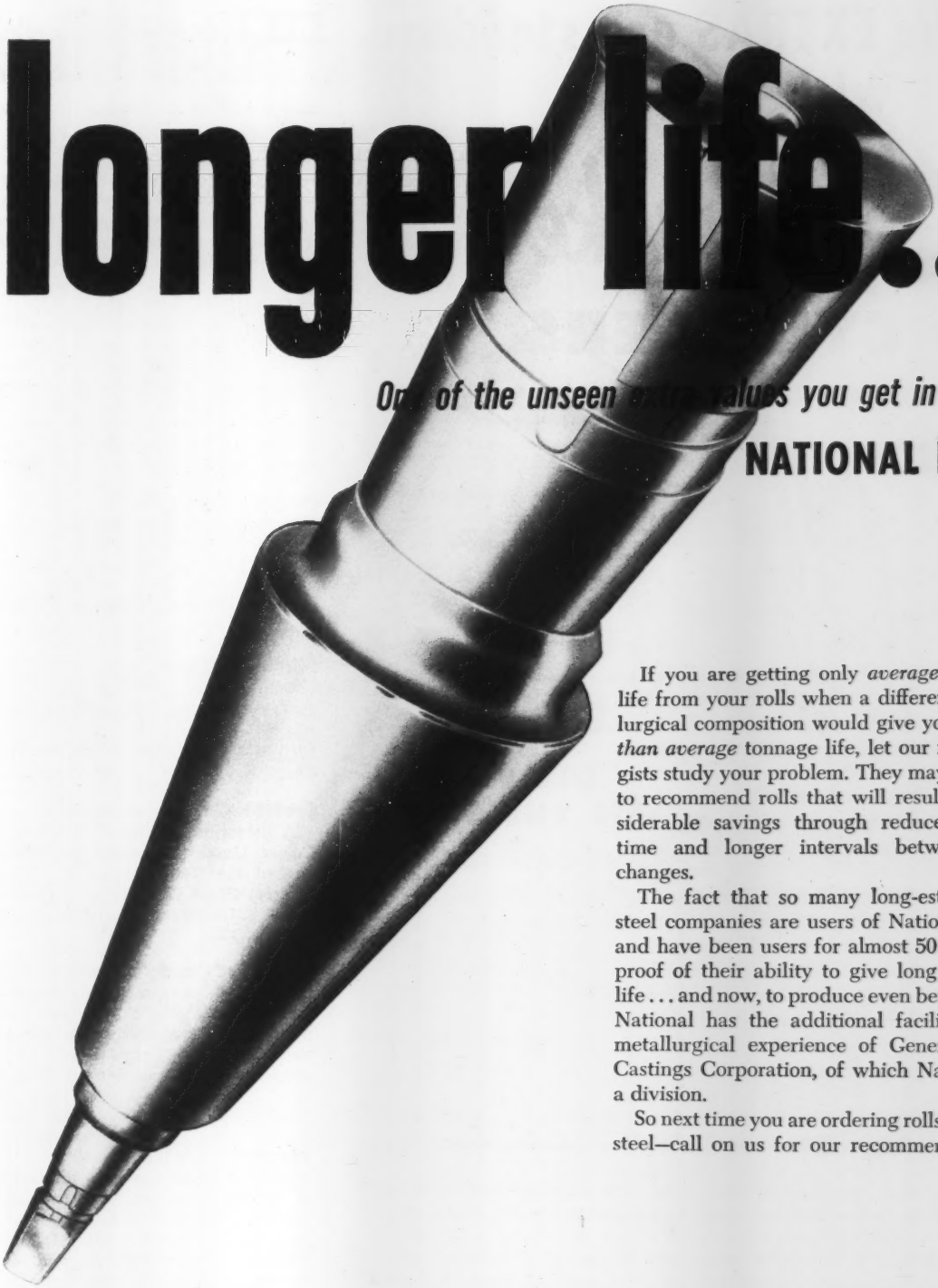
THOMAS

THOMAS FLEXIBLE COUPLING COMPANY
WARREN, PENNSYLVANIA, U.S.A.

longer life...

One of the unseen extra values you get in every

NATIONAL ROLL



If you are getting only *average* tonnage life from your rolls when a different metallurgical composition would give you *longer than average* tonnage life, let our metallurgists study your problem. They may be able to recommend rolls that will result in considerable savings through reduced down time and longer intervals between roll changes.

The fact that so many long-established steel companies are users of National rolls, and have been users for almost 50 years, is proof of their ability to give long tonnage life . . . and now, to produce even better rolls, National has the additional facilities and metallurgical experience of General Steel Castings Corporation, of which National is a division.

So next time you are ordering rolls—iron or steel—call on us for our recommendations.

GENERAL STEEL CASTINGS CORPORATION

NATIONAL ROLL & FOUNDRY DIVISION

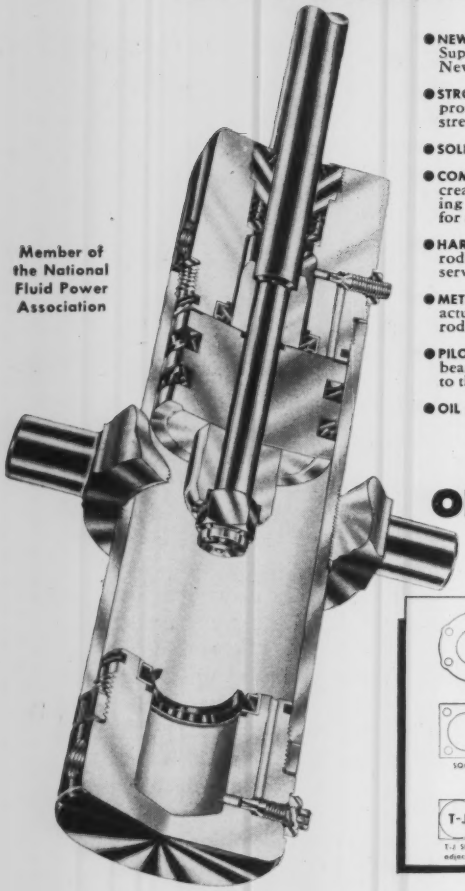
Avonmore (Westmoreland County) Pennsylvania

General Steel Castings Corporation: General Offices, Granite City, Ill. • Plants: Granite City, Ill.—Eddystone, Pa.—Avonmore, Pa.

all the EXTRAS are standard with

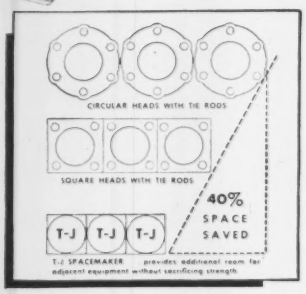
T-J Spacemaker CYLINDERS

Member of the National Fluid Power Association



- **NEW** *exclusive* ingenious cushion designs... Super Cushion Flexible Seals for Air . . . New Self-Aligning Master Cushion for Oil.
- **STRONGER** than outmoded tie rod design, proven through actual tests. No tie rods to stretch.
- **SOLID STEEL HEADS** throughout the full line.
- **COMPACT DESIGN** eliminates tie rods, increasing the strength and reducing mounting space required, providing extra room for adjacent equipment.
- **HARD CHROME PLATED** body bores and piston rods . . . assure you of long trouble-free service. (Standard at no extra cost.)
- **METALLIC ROD SCRAPER**, not just a wiper, actually removes foreign matter from the rod.
- **PILOTED PACKING GLAND** with extra long bearing. Additional strength and support to the piston rod.
- **OIL** pressure to 750 p.s.i. AIR to 200 p.s.i.

DELIVERY OFF THE SHELF!



You *save 40% space* when you switch from outmoded tie rod cylinders to the T-J Spacemaker! It's stronger, too! Fits right into automation programs in countless plants. Delivers top performance and dependability with a big *plus* in advanced features. Wide range of styles, capacities . . . reduces man-hours and costs in all kinds of push-pull-lift jobs. Off-shelf delivery in 64,000 combinations!

NEW LITERATURE—Send today for new Catalog SM56 with complete engineering details on Spacemaker line. Write The Tomkins-Johnson Co., Jackson, Mich.

T-J TOMKINS-JOHNSON
RIVITORS AIR AND HYDRAULIC CYLINDERS CUTTERS CLINCHORS

NEW Literature

Write directly to the company for a copy

Belt Conveyors

Several engineering advances in power belt conveyors are featured in a new catalog. Speedways Conveyors Inc., 189 Speedways Bldg., 202 Rhode Island St., Buffalo 13, N. Y.

Curtain Wall Sealers

Eleven case histories together with properties and performance data on a new family of polysulphide-rubber-base sealers are given in catalog Z-CWS-1-57, 4 pages. Adhesives & Coatings Division, Minnesota Mining & Mfg. Co., 423 Piquette Ave., Detroit 2, Mich.

Foundry Products

Technical Bulletin FP-130 covers five products for the CO_2 process: Sand conditioner, liquid core paste, mudding compound, cleaning compound and binder. Frederic B. Stevens Inc., 1800 18th St., Detroit 16, Mich.

Milling Cutters

Bulletin 572 describes the Series 900 milling cutters with locking wedges for milling with indexible throwaway carbides. McCrosky Tool Corp., S. Main St., Meadville, Pa.

Freight Car Handling

A performance report, "7 Steps to Lower Costs," describes the operation of two Trackmobiles at Verson Allsteel Press Co., Chicago. Whiting Corp., 157th street & Lathrop avenue, Harvey, Ill.

Hose, Ends and Assemblies

This 40-page catalog lists complete information on bulk industrial hose, permanent hose assemblies, swaged assemblies and ends and swivel adapters. Customer Service Department, Weatherhead Co., 128 W. Washington Blvd., Ft. Wayne, Ind.

Magnetic Clutchs

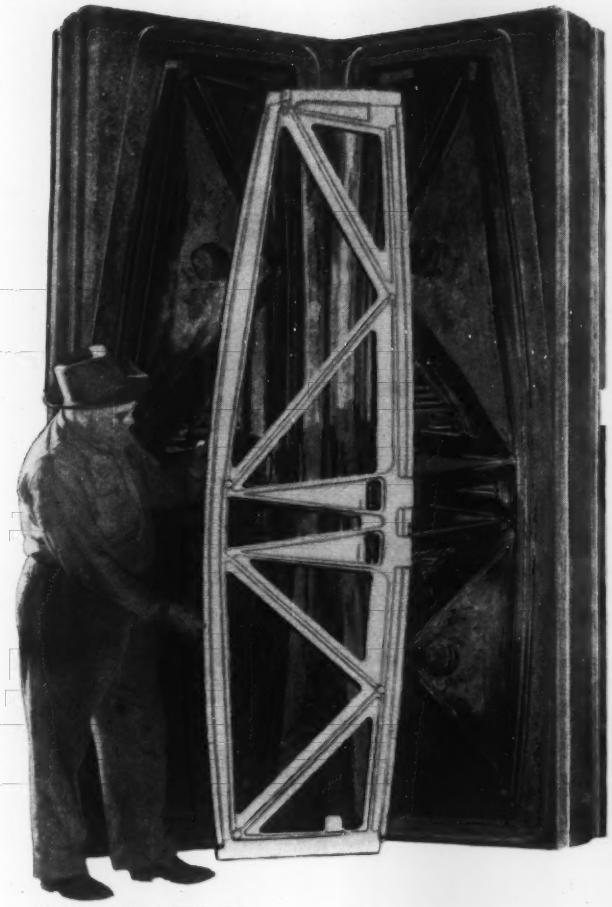
Bulletin M-101 provides dimensional drawings and specifications of a line of magnetic clutches for machine tools. Fawick Airflex Division, Fawick Corp., 9919 Clinton Rd., Cleveland 11, O.

Hydraulic Cylinders

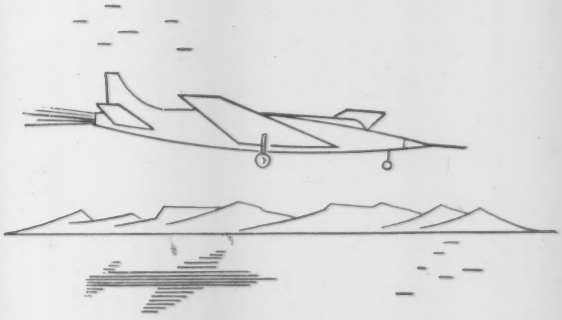
Bulletin 57-68 gives detailed information on the construction and features of 2000-psi cylinders. Vickers Inc., Detroit 32, Mich.

Tumbling Machines

Two 12-page catalogs (132-D and 129-D) describe the new 7 and 14



COURTESY ALUMINUM COMPANY OF AMERICA



Increase Production

with FINKL DIE BLOCKS

...the aircraft industry does!

These two 14 x 35 x 114″ FX die blocks, made from Finkl electric furnace steel, and weighing 15,800 pounds each, are used for producing precision aluminum landing gear rib forgings.

Finkl FX die blocks are noted for their long production runs and economy because:

- FX covers the full usable hardness range from Temper H (477-444 BHN) to Temper 4 (293-269 BHN).
- FX produces the greatest number of forgings per impression because its well balanced alloy content offers uniform hardness and freedom from temper brittleness. Relatively high tempering temperature promotes ductility and elimination of residual stresses.
- FX Special Machining Quality appreciably reduces shanking and sinking time.

These proved advantages can also mean savings to you with more pieces per die and better deliveries to your customers.

Save money by talking to a Finkl representative the next time you are considering die blocks or forgings.

DIE BLOCKS · FORGINGS · HOT WORK STEELS · ELECTRIC FURNACE STEELS

A. Finkl & Sons Co.

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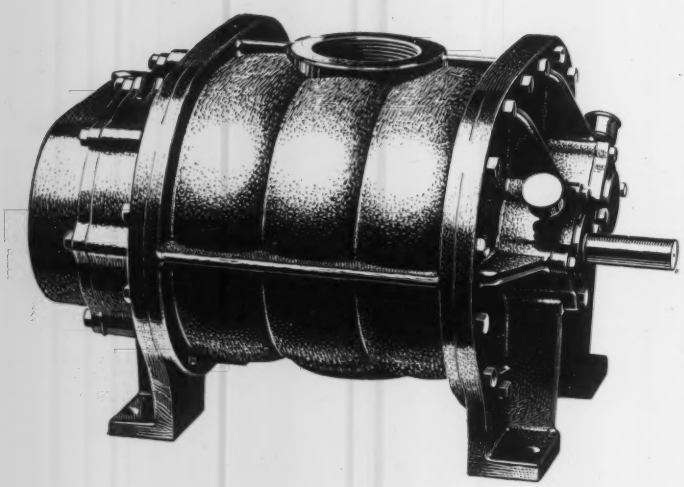


R-C rotary positive blowers deliver clean air in large or small volumes

Whether you require 5 or 100,000 cfm of accurately controlled volumes of air, Roots-Connersville rotary positive blowers assure performance that meets the most exacting specifications.

- No internal lubrication . . . air is free of oil vapors or moisture.
- High volumetric efficiency maintained with negligible slippage and with constant volumes delivered regardless of pressure.
- Impellers make no internal contact keeping friction loss small.
- Higher operating speeds result in reduced first cost, less weight and floor space. Horsepower is determined by operating pressure, resulting in maximum power savings.
- Drives may be direct-connected to electric motors, turbines, steam or gas engines . . . or speed reducing gears or V-belts.

In chemical, waste treatment, refining, paper and many other industries, R-C blowers have earned outstanding acceptance. R-C application engineers will welcome the opportunity to help solve your problem, large or small. Write for Bulletins AF-154 on small blowers or RB-154 on large units.

Engineers—unusual career opportunities await you at Roots-Connersville. Address your resume to Professional Employment Manager.

ROOTS-CONNERSVILLE BLOWER

A DIVISION OF DRESSER INDUSTRIES, INC.

557 Hillside Avenue, Connersville, Indiana. In Canada—629 Adelaide St., W., Toronto, Ont.

NEW LITERATURE

cu ft capacity models of the Wheelabrator Super Tumblast machines. Wheelabrator Corp., 1157 S. Byrkit St., Mishawaka, Ind.

Stainless Bar and Wire

This 24-page booklet describes 45 types of stainless steel bars and wire. Information covers properties, fabrication, electropolishing, ebonizing and supply. Product Information Service, Armco Steel Corp., Middletown, O.

Fire Detection System

A 12-page booklet describes the Kidde-Atmo, a rate-of-temperature-rise fire detector system. J. H. Scharff Inc., subsidiary of Walter Kidde & Co. Inc., Orange, N. J.

Acid Stripping, Burnishing

Technical Data Sheet 20 describes two acid electrolytic strips for zinc diecastings, brass and aluminum. Technical Data Sheet 49 describes burnishing compounds. MacDermid Inc., Waterbury, Conn.

Aircraft Alloy Steels

This price and stock catalog includes chemical crossreference analysis and engineering tables of aircraft quality alloys. Shultz Steel Co. Inc., 5321 Firestone Blvd., South Gate, Calif.

Pipe Threading Machines

Bulletin C-77-7 gives detailed data on three sizes of Receding Chaser Pipe Machines. Landis Machine Co., Waynesboro, Pa.

Brazing Rings

Engineering Data Sheet 19 describes new Nicrobraz brazing rings for stainless and high alloy steel tube assembly work. Stainless Processing Division, Wall Colmonoy Corp., 19345 John R St., Detroit 3, Mich.

Small Metal Parts

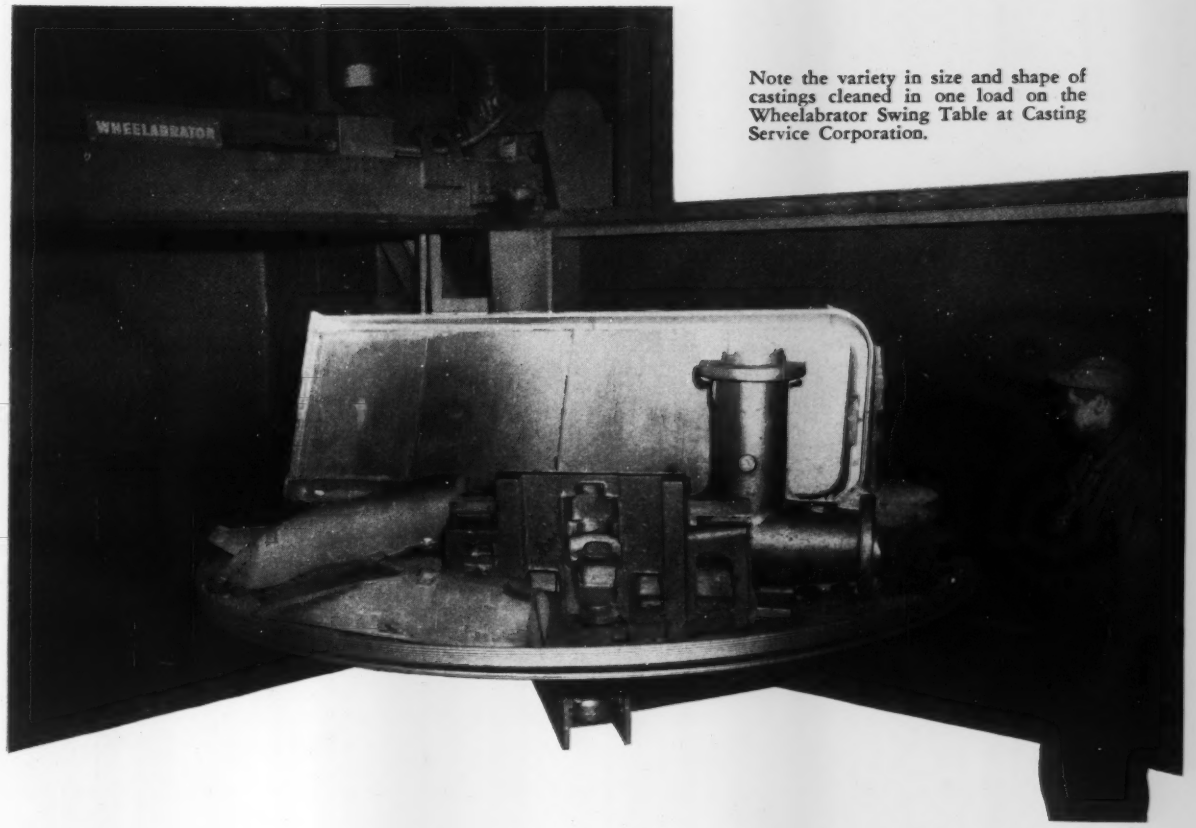
Catalog 21, 44 pages, describes a complete line of standard lugs, clips, terminals and wire forms. Zierick Mfg. Corp., Beechwood avenue, New Rochelle, N. Y.

Aluminum Bus Conductors

A 280-page handbook presents comprehensive engineering data on properties and uses of aluminum bus conductors. Aluminum Co. of America, 793 Alcoa Bldg., Pittsburgh 19, Pa.

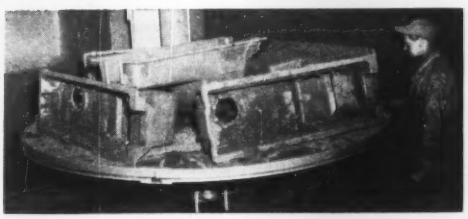
Diecasting, Molding Kit

Charts and other data are assembled in a product designer's kit to acquaint him and the production man

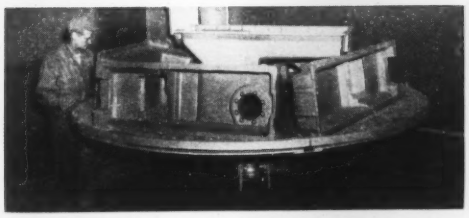


Note the variety in size and shape of castings cleaned in one load on the Wheelabrator Swing Table at Casting Service Corporation.

Whether they're long — or short — or tall
WHEELABRATOR® Swing Table cleans them all!



Diesel engine oil pans are cleaned 5 at a time. These gray iron castings are 46½" long, 15½" wide and 17" high.



Blasted 3 minutes on each side, this is how the castings look after having been scoured of sand and scale.

Ability of a 96-inch Wheelabrator Swing Table to clean mixed loads of large and small castings is an important extra advantage for Casting Service Corporation of LaPorte, Indiana. Being a jobbing foundry, it requires speed and flexibility in its equipment to meet customer deadlines and demands. Gray iron and semi-steel pieces are cleaned in the green state and after normalizing, without waiting to accumulate loads of castings of the same size and weight. This provides fast, thorough, low-cost cleaning, while permitting a steady flow of work.

For detailed information on the Swing Table story, send today for Bulletin No. 119D.

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509 South Byrkit Street, Mishawaka, Indiana

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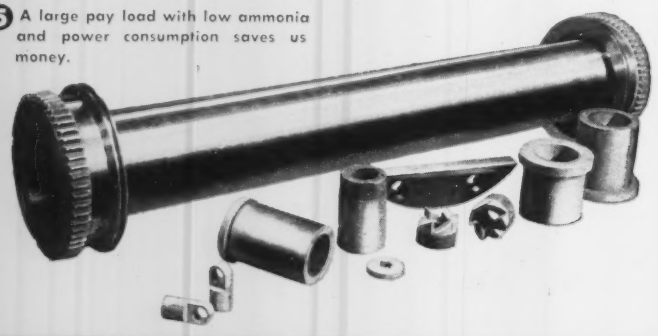
2. This Hevi Duty Furnace is adaptable to the Floe process of Nitriding.
3. We get uniformity throughout the entire load.
4. The parts come out clean and treated to very close tolerances.
5. A large pay load with low ammonia and power consumption saves us money.
6. This furnace stands up under continuous use.
7. Control is easy, giving us exacting case depths in each heat and uniformity from heat to heat."

These and the many other advantages built into Hevi Duty Nitriding Furnaces can benefit you. Write for more information today — Bulletin HD-646-R.



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NEW LITERATURE

with cost reductions possible through diecastings and thermoplastic moldings. Gries Reproducer Corp., 400 Beechwood Ave., New Rochelle, N. Y.

Stainless Steel Fastenings

Catalog 56-A, 24 pages, covers over 7000 items. Hinges and screw machine products are featured. Star Stainless Screw Co., 655 Union Blvd., Paterson 2, N. J.

Industrial Gearing

Booklet B-7012, 12 pages, outlines the design facilities and manufacturing capacity of this company to produce custommade gearing. Westinghouse Electric Corp., P.O. Box 2278, Pittsburgh 30, Pa.

Carbide Tool Guide

A 12-page service bulletin contains information on a complete line of end mills, internal grinding tools, drills, tool sets, reamers, boring tools and bur sets. Abrasives Division, Elgin National Watch Co., Elgin, Ill.

Vinyl Laminates

Colorful vinyl plastic which can be laminated to metals is displayed in this 4-page bulletin. North East Laminates Inc., Methuen, Mass.

Motorized Brinell Tester

Bulletin A-15 describes a rapid production unit that lets you see the diameters of the ball impressions through a reflex optical system. Testing Machines Division, Gries Industries Inc., New Rochelle 6, N. Y.

Carbides

This series of 15 data sheets describes the properties of various carbide grades. Carmet Division, Allegheny Ludlum Steel Corp., 1500 Jarvis Ave., Detroit 20, Mich.

Fork Trucks

Operating characteristics and mechanical details of a line of electric trucks are presented in this 8-page bulletin. Industrial Truck Division, Clark Equipment Co., Battle Creek, Mich.

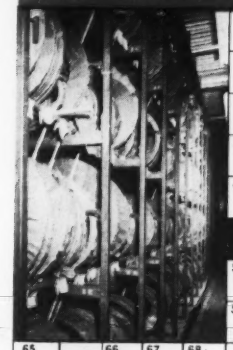
Explosive Valves

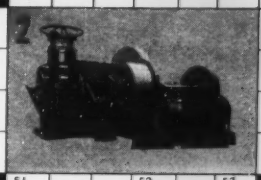
Normally open and normally closed valves with zero leakage are described in this 8-page bulletin. Explosive Valve Division, Conax Corp., 2300 Walden Ave., Buffalo 25, N. Y.

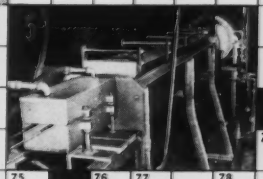
Colored Aluminum

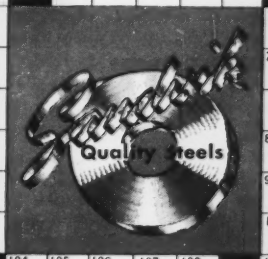
Aluminum coils with widths of ½ to 36 in. and thicknesses of 0.016 to 0.051 in. supplied in 20 colors are

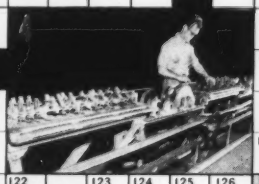
SANDVIK Clues To The Solution Of Your SPRING STEEL PUZZLES

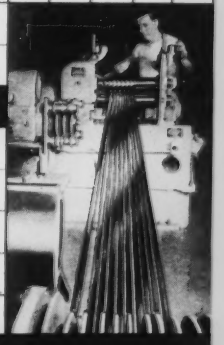












The pictures above give you some strong hints of Sandvik's ability to supply *exact* answers to your spring steel requirements.

Here's what they represent:

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NEW LITERATURE

described in this 4-page bulletin. Reynolds Metals Co., 2500 S. Third St., Louisville 1, Ky.

Conveying

Catalog 157, 42 pages, details the features and uses of in-floor and overhead tow conveying systems. Jervis B. Webb Co., 8951 Alpine Ave., Detroit 4, Mich,

Low Temperature Cabinets

Bulletin 2-57, 4 pages, describes four models of subzero industrial freezers. Department 2B-297, Webber Corp., P.O. Box 217, Indianapolis 6, Ind.

Heat Treating

A glossary of heat treating terms and a series of engineering tables are included in this 32-page bulletin. Pittsburgh Commercial Heat Treating Co., 49th St. & A.V.R.R., Pittsburgh 1, Pa.

Oil Burners

Bulletin 409A, 4 pages, describes burners that provide individual adjustment of oil and air. Hauck Mfg. Co., 124-136 Tenth St., Brooklyn 15, N. Y.

Stainless Tubing

Properties of stainless tubing and pipe are presented in this 4-page bulletin. Alloy Tube Division, Carpenter Steel Co., Union, N. J.

Turret Lathe Machining

Specifications of contour attachments for turret lathes are given in bulletin 5702, 8 pages. Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, O.

V-Belt Maintenance

Precautions that extend the life of V-belts are given in bulletin 20X-6234C, 12 pages. Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Barrel Finishing

Abrasive chips and shapes for finishing ferrous and nonferrous castings, diecastings, steel forgings and screw machine parts are covered in this 4-page bulletin. Department 26, Macklin Co., Jackson, Mich.

Oilers

Bulletin 33-A, 4 pages, describes multiple feed oilers that use tapered feed adjustment screws. Trico Fuse Mfg. Co., 2948 N. Fifth St., Milwaukee 12, Wis.

Fluorescent Testing

Selection of materials and techniques for fluorescent testing are discussed in this 16-page bulletin. Magnaflux Corp., 7300 W. Lawrence Ave., Chicago 31, Ill.

Optical Tooling

Jig transits, alignment telescopes, tilting levels and accessories are covered in this 17-page bulletin. Keuffel & Esser Co., Hoboken, N. J.

Metal Abrasives

The specifications and uses of abrasive shot and grit are presented in this 16-page bulletin. Cleveland Metal Abrasive Co., 887 E. 67th St., Cleveland 8, O.

Safety Switch

A switch for grinders that turns on when the worker picks up his goggles or face shield and stops the machine when they are put back is described in this 4-page bulletin. Harold Dessau Inc., 25 Murray St., New York 7, N. Y.

Safety Kit

A guide booklet of correct lift truck operation, a set of cartoon safety posters and directional and warning signs make up the plant

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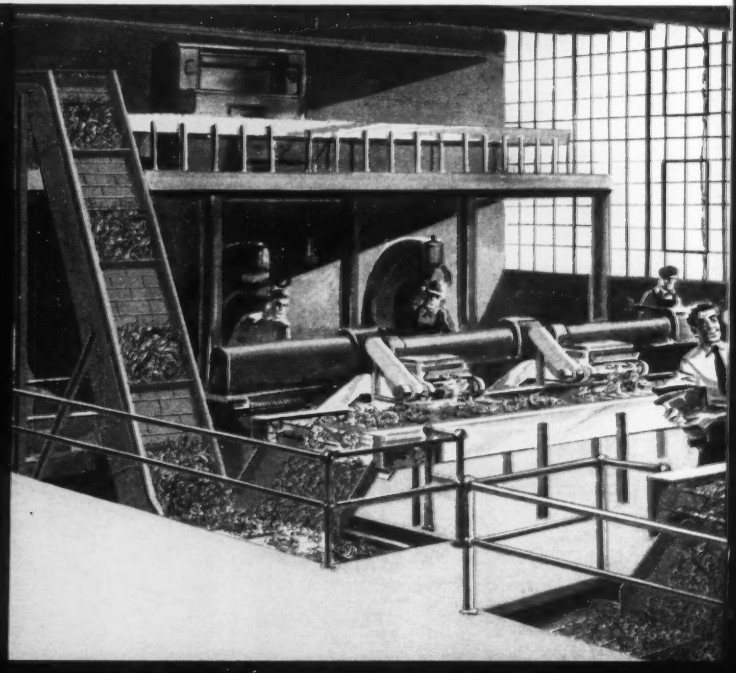
Conveyor Standardization SAVES YOU MONEY...



NOW...

NEW LITERATURE

safety kit. Towmotor Corp., 1226 E. 152nd St., Cleveland 10, O.

Gas Burners

Bulletin SC-1001 describes a burner which produces a sharp, spearlike heating flame used for brazing, soldering and preheating. Selas Corp. of America, Dresher, Pa.

Plastic Coated Pipe

Steel pipe and tubing covered with plastic for severe corrosive conditions are described in bulletin ADV. 770, 4 pages. Advertising Division, Republic Steel Corp., 3100 E. 145th St., Cleveland 27, O.

Core Binders

Bulletin 450, 4 pages, covers characteristics and uses of oil, air setting, CO_2 and resin binders. Foundry Products Division, Archer-Daniels-Midland Co., 2191 W. 110th St., Cleveland, O.

Instrument Transformers

This 1957 buyer's guide, GEC-1028B, 90 pages, contains price and product information on a complete instrument transformer line. General Electric Co., Schenectady 5, N. Y.

Pressure Tubing

Flexible tubing made of polyamide is presented in bulletin BR-3A, 4 pages. Polymer Corp. of Pennsylvania, 2140 Fairmont Ave., Reading, Pa.

V-Belts

Solutions to the problem of V-belt maintenance are presented in this 4-page bulletin. Manheim Mfg. & Belting Co., 2000 Stiegel St., Manheim, Pa.

Filters

This 8-page bulletin describes six types of filters for industrial uses. Department GB-297, Industrial Filtration Co., Lebanon, Ind.

Steel Buildings

Bulletin SX-14456, 8 pages, describes the advantages of buildings made of steel panels. Product Information Service, Armco Drainage & Metal Products Inc., Middletown, O.

Malleable Chains

Conveyor, elevator and power transmission chains are described in this 8-page bulletin. Moline Malleable Iron Co., St. Charles, Ill.

Press Computations

Booklet 38, 50 pages, contains information and alignment diagrams for computing pressure and sustained work capacity of presses, as well as pressure and work requirements of the job. E. W. Bliss Co., 1375 Raff Rd. S.W., Canton, O.

Punching and Notching

This 72-page manual covers vertical and horizontal models of a line of punching and notching units. Toolset Inc., 1411 Military Rd., Buffalo 17, N. Y.

Resistors

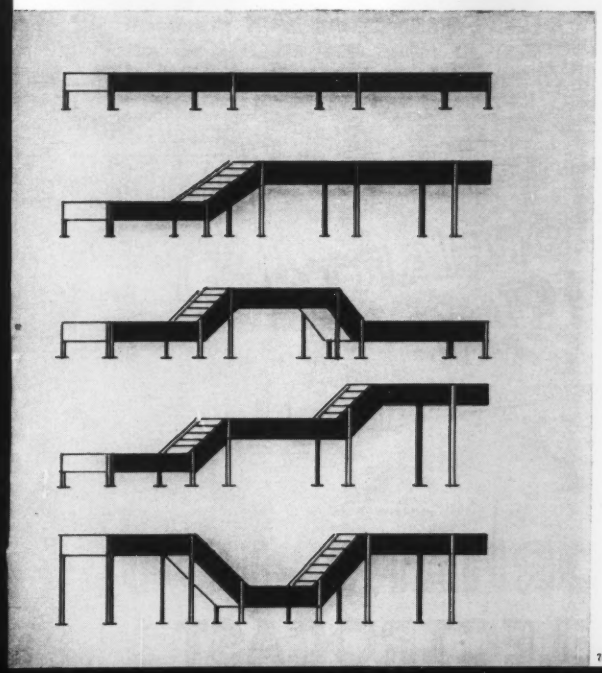
Bulletin C-1b, 12 pages, describes power wire wound resistors—tubular, flat, noninductive and ferrule types. International Resistance Co., 401 N. Broad St., Philadelphia 8, Pa.

Gear Hobber

A tandem unit easily adapted to automation is described in an 8-page bulletin. Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.

Thermal Drying

Bulletin 756, 20 pages, presents technical data on various types of dryers. McNally Pittsburg Mfg. Corp., Pittsburg, Kans.



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The May-Fran conveyor standardization program provides the standard components that can be assembled to form a special or standard conveyor. These same components can be re-arranged at any time to solve production problems in the future.

In addition, standard components mass produced mean conveyor economy right from the beginning.

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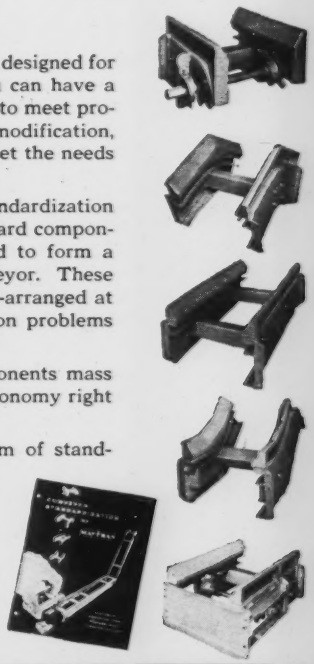
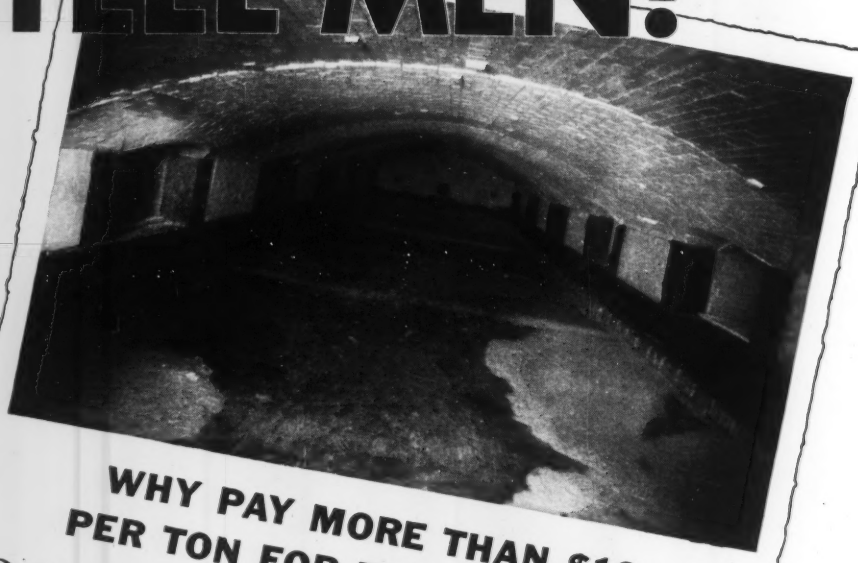


and in the **FUTURE!**

MAY-FRAN ENGINEERING, INC.

1725 Clarkstone Rd., Cleveland 12, O.

STEEL MEN!



WHY PAY MORE THAN $12 PER TON FOR FLUX BLOCKS?

ORIGINALLY, glass tanks were built of small, fire-clay brick or sandstone blocks. No. 1 fire-brick of this type can be bought for $12 per ton. Clay flux blocks of essentially the same materials cost $60 per ton. Why pay a 500% premium simply to get *bigger pieces* of the same material?

Your reply, of course, is that the larger pieces improve furnace life by 40% to 50%—that you are willing to pay 500% more for your blocks, to get 50% greater life for your tanks. And that is true of every glass-tank owner in America today. Since you are already paying a 500% premium for a 50% return, *why is it not logical for you to buy Corhart Electrocast, at a smaller price premium over clay,* AND GET OVER 200% INCREASE IN FURNACE LIFE?

If you are looking for economy in the purchase of your tank blocks, you need pay only $12 per ton. On the other hand, if you want the lowest cost per day of tank life, or the lowest cost per ton of glass produced, you can not stop at the $12 block *or at the* $60 *block.*

Corhart Electrocast is the world's highest-priced refractory per ton of blocks, and the lowest-cost refractory per ton of glass produced . . . May we *prove* it to you? Write for definite facts. *Address:* Corhart Refractories Co., *Incorporated,* 16th and Lee Sts., Louisville, Ky.

CORHART ELECTROCAST REFRACTORIES

IN June, 1933, when this old ad appeared, Corhart Electrocast was still new in the glass industry. Only a few glass companies dared then to buy it, "one of the world's highest-priced refractories". But today its use is practically universal . . .

Now Corhart 104 is still new in the steel industry — but despite its high price, it offers steel furnace operators the same opportunities for greater production and lower costs that Corhart Electrocast brought to glass.

May we send you complete data? Address: Corhart Refractories Co., Incorporated, 1616 West Lee Street, Louisville, Kentucky, U.S.A., SPring 8-4471.

QUALITY ECONOMY ENDURANCE

CORHART 104 ELECTROCAST REFRACTORY

The words "Corhart" and "Electrocast" are registered Trade Marks which indicate manufacture by Corhart Refractories Company, *Incorporated.* Corhart Refractories Co., *Incorporated,* 1600 West Lee Street, Louisville 10, Kentucky, U.S.A.—Telephone SPring 8-4471.

Market Outlook

STEEL PRODUCTION continues to decline, but it may be near a leveling off. An upward movement in scrap prices suggests this. Consumption of scrap—an important raw material for steelmaking—moves up and down in relation to steel production.

Scrap prices started downward last December—three months ahead of the decline in steel production.

REPETITION—Scrap prices turned upward in the week ended May 1 and continued in that direction in the week ended May 8. The latest movement pushed up STEEL's price composite on steelmaking grades of scrap 66 cents a gross ton. The preceding week's increase was $1.17. The composite now is $44.33 a gross ton.

Some people expect scrap prices to follow a seesaw pattern through the summer.

EXPORTS LIMITED—What effect new federal limitations on scrap exports will have on prices remains to be seen. The Commerce department decreed that shipments of No. 1 and No. 2 heavy melting steel scrap to Japan, the United Kingdom and the European Coal & Steel Community this year cannot exceed those in 1956. This means that Japan is shut off. Its take from the U.S. has already hit the 1956 level. The UK and the ECSC have been restricting themselves to their 1956 rates.

OUTPUT DECLINES—The downward movement in steel production lowered the ingot rate to 87 per cent of capacity in the week ended May 12. The preceding week's rate was 88.5. Output in the week ended May 12 amounted to 2,226,000 net tons of steel for ingots and castings—smallest outturn since August, 1955.

Current steel production rates are not geographically uniform. They range from a low of 56 per cent in New England to 99 per cent in the western district. Some plants in the West are running at 104 per cent of capacity.

VARIETY—Demand for steel is mixed, too. In some consuming industries, buyers are apathetic, but shipyards continue to expand their demand for heavy plates. Because of the heavy and accumulating bookings for this product, some yards have contracted for conversion tonnage to meet their most pressing needs.

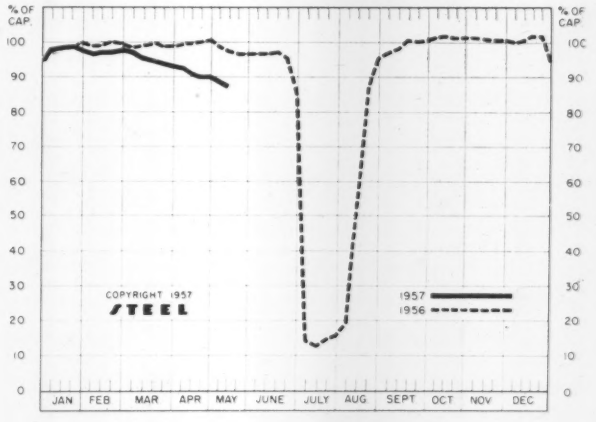
A HELP—The demand for plates is helping the continuous hot sheet mills. These mills have open space, largely because of the reduced need for hot bands that ultimately become cold-rolled sheets. (Demand for cold-rolled sheets shrank when automobile and appliance output slowed down.) Some of the hot sheet mills are filling in their schedules with rollings of strip plate.

Construction industry demands for reinforcing bars are aiding merchant bar mills, too. Orders for merchant bars are off, but producers are filling in some of the empty space by rolling reinforcing bars.

SPEED-UP—Easing in demand for nickel is speeding up deliveries of stainless clad steel plates. Now that stainless steel is in improved supply, plates clad with stainless are being promised for delivery in eight weeks.

Steel prices as a whole remain stable, although a 1.5 cent decline last week in zinc lowers the price on galvanized steel products.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

(Percentage of Capacity Engaged)

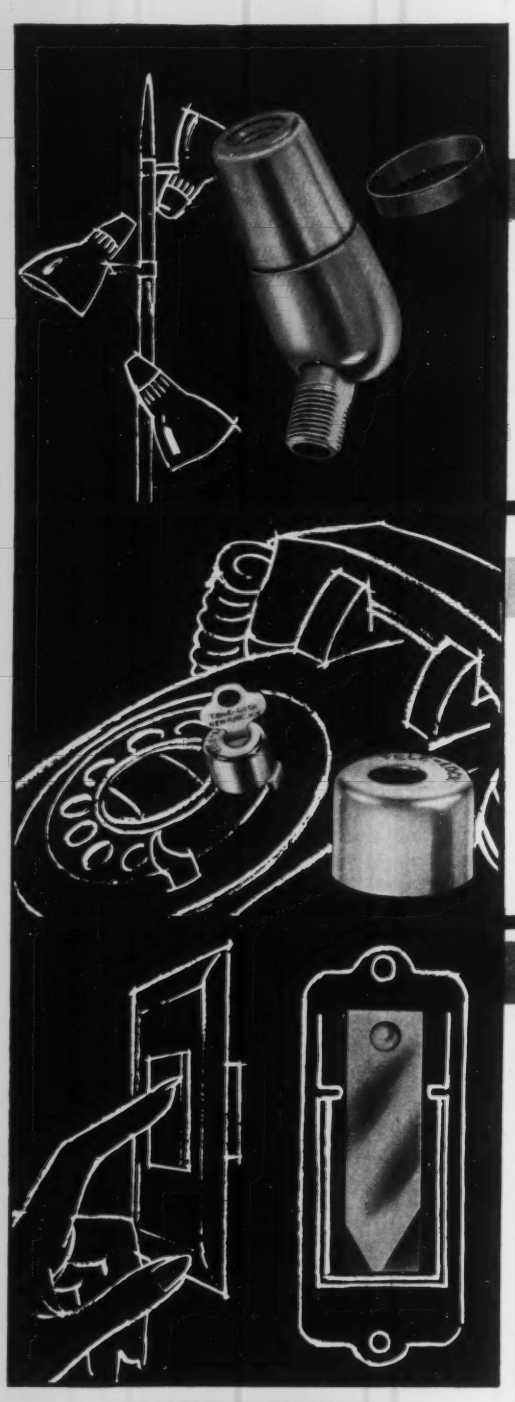
	Week Ended May 12	Change	Same Week 1956	Same Week 1955
Pittsburgh	93	+ 2.5*	100	99
Chicago	87.5	— 1*	99.5	100.5
Mid-Atlantic	95.5	— 0.5	99	96.5
Youngstown	84	— 2	98	98
Wheeling	81.5	— 8.5	101	95.5
Cleveland	85.5	0*	95.5	102
Buffalo	92.5	— 2.5	105	104.5
Birmingham	95.5	0	23.5	93.5
New England	56	0	89	88
Cincinnati	69	+ 9	93	89.5
St. Louis	84	— 6	96.5	106
Detroit	82.5	— 9.5	97	88.5
Western	99	— 1	109	100
National Rate	87	— 1.5	97.5	96.5

INGOT PRODUCTION‡

	Week Ended May 12	Week Ago	Month Ago	Year Ago
INDEX (1947-1949=100)	139.4†	138.6	143.8	145.9
NET TONS (In thousands)	2,210†	2,226	2,310	2,343

*Change from preceding week's revised rate. †Estimated. ‡Amer. Iron & Steel Institute. Weekly capacity (net tons): 2,559,490 in 1957; 2,461,893 in 1956; 2,413,278 in 1955.

Metalworking Outlook—p. 63 Technical Outlook—p. 119



How three manufacturers use Anaconda superfine-grain alloys

DURAFLEX® makes swivel lamps swivel better

Berger Machine Products of Maspeth, New York, manufacturers of lighting-fixture parts, had a problem with a swivel fixture. To allow adjustment of the reflector, the two steel parts (illustrated) have to rotate 350 degrees. Steel-on-steel froze and locked. A brass ring bushing helped, but being soft allowed the steel to cut in and bind. Berger tried Duraflex, Anaconda's superfine-grain phosphor bronze, and found the answer. Its springiness, hardness and wear-resistance made a snug fit which turned easily and would hold in any position.

FORMBRITE® helps finish phone locks faster

Tele-Lock, an ingenious device for locking a dial phone, is encased in a chromium-plated brass cup. Slaymaker Lock Co., Lancaster, Pa., was using ordinary drawing brass for this cup and found finishing costs high. They turned to Formbrite, Anaconda's superfine-grain forming brass. The cups were easy to form; the slight extra spring and hardness made the fit perfect. The smooth surface of Formbrite eliminated one polishing operation and provided an ideal surface for a lasting chromium plate.

DURAFLEX makes superior contacts for Touch-Plate®

Touch-Plate Mfg. Corp., Long Beach, Calif., makes low-voltage switch systems for control of lighting in the home. It takes only a flick of the finger or elbow on the momentary contact switches to actuate a relay, or set of relays, which turns lights on or off in one room or through the house. For the contact strips in Touch-Plate wall switches they now use Duraflex, Anaconda's superfine-grain phosphor bronze, because they found it has more spring, better recovery properties. Duraflex is now used also for contacts in the relays which operate the Touch-Plate system.

FOR INFORMATION WRITE: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

5767

DURAFLEX

The new superfine-grain phosphor bronze with greater endurance limit.

FORMBRITE

The new superfine-grain drawing brass that cuts finishing costs.

ANACONDA®

PRODUCTS

MADE BY THE AMERICAN BRASS COMPANY

Reinforcing Outlook Good

Inventories rose during first quarter because bad weather held off construction. Heavy midsummer demand may create a tight market for reinforcing materials

COMES midsummer, reinforcing steel—both welded wire fabric and reinforcing bars—may be plenty tight. Despite a slow start in the first quarter, producers are almost unanimously agreed that 1957 as a whole is going to be better than record 1956. They are counting on bulge in demand at the height of the building season.

Late winter blizzards and heavy floods have held up much of the work ordinarily started by this time, piling up reinforcing materials in the hands of distributors and contractors. Those inventories are nearly worked off now, and the flow of orders is beginning to increase.

Three Markets—Practically all markets for reinforcing materials are booming again this year. Building will set a record in dollar volume, and physical volume should be at least equal to that of 1956. While there has been some easing in structural demand, producers of reinforcing materials do not think it will affect their markets appreciably. They feel that structures designed for reinforced concrete offer savings to the builders, particularly for buildings up to 25 or 30 stories. Above that height, they admit that structural steel is the best material. In addition, large tonnages of reinforcing bars will be consumed by industrial building this year.

Road building and bridge construction will be in line with the 1956 pace—good but not spectacular. Producers do not expect the federal road building program to increase their market appreciably until 1958, perhaps 1959.

In Pittsburgh, Jones & Laughlin Steel Corp. is experimenting with a prestressed concrete roadway which, if successful, would open a new market for wire as a reinforcing material. (See picture, right.) Many experimental projects involve the use of wire fabric in asphaltic cement for highways and driveways. (While it is still too early to draw conclusions, the applications represent a sizable potential market.)

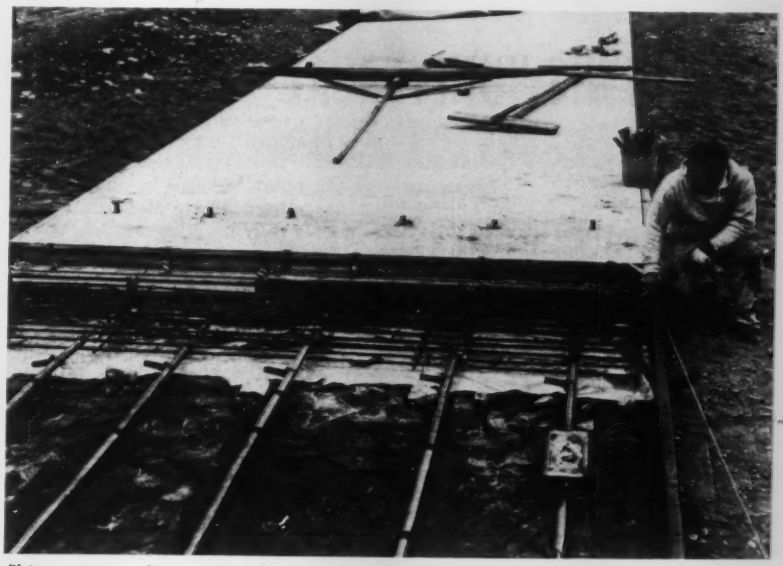
Another big market—concrete reinforced pipe—is on the upswing, following the road building trend. It represents about one-third of the market for wire fabric.

Good Capacity — There apparently is no shortage of capacity for reinforcing material. Producers of welded wire fabric can turn out between 875,000 and 900,000 tons this year. Even if shipments reach the most optimistic guesstimate (about 550,000 tons), this would represent an annual rate of only 63 per cent of capacity. But most producers are fearful that demand will peak over the summer months.

There is little limit on capacity for reinforcing bars because they are produced on the same mills that make ordinary hot-rolled bars. At present, this segment of the industry is tremendously competitive, because producers who usually supply the automotive and farm machinery industries are turning to the construction field to help fill out mill schedules. If demand for hot-rolled bars picks up, there may be a squeeze on reinforcing bar capacity.

Shift in Buying—The fast expansion of the industry in the last five years is a big reason for the shift in buying habits of contractors, some officials believe. In the past, demand has been fairly evenly spread over all four quarters, with only a slight bulge in the spring. Now, as one producer puts it: "Contractors hear there is plenty of capacity, so they count on short delivery time to keep cash from being tied up in inventories. If they would continue to buy during the winter for spring needs, there would be no tightening of supply in the summer."

Another reason contractors aren't buying as heavily in the winter: Many state highway departments pay only on a work-completed basis. In addition, they can't plan on the next summer's work because too many contracts are let in the spring. The Wire Reinforcement Institute has recommended to a Senate roads subcommittee that contracts be let in the fall so that contractors will know what materials will be needed. The insti-



This prestressed concrete roadway being tested by Jones & Laughlin Steel Corp. is designed to overcome the inherent weakness of concrete in tension. Wire strands in flexible steel conduits are anchored at opposite ends of a 400-ft section and put under stress by special jacks before the concrete is poured

tute also believes that if payment were made on the basis of materials delivered, contractors could spread their orders over a longer period without tying up their own cash and avoid peaks in demand.

Labor Problems—This situation is perhaps more critical for fabric producers than for re-bar makers. Special welding machinery is required to fabricate wire mesh. To hold onto their skilled workers, fabric makers say they cannot afford to shut down their lines when orders fall off. But they can't afford to build up inventories too high just to keep the operators on the machines, either. They would welcome any scheme which would even out demand.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 201

Construction, bridge and dock building contribute to the bright outlook for sales of reinforcing bars in June and July. The market remains strongly competitive, with numerous merchant bar mills supplying reinforcing bars during a lull in their operations.

Producers are taking third quarter orders, but the competitive status of this market makes it impossible for them to book orders well into that quarter. Several of the leading bar mills are taking orders for June delivery.

Steel Bars . . .

Bar Prices, Page 201

Barmakers continue to accept orders for June delivery, including large flats (3 x ½-in. and up) which are in better demand than other bar sizes. A last minute rush of orders probably will make June's sales better than had been anticipated.

Mills supplying auto makers have some excess capacity, and they are devoting this to production of reinforcing bars. Suppliers to the agricultural implement industry also have open space on their order books. A fairly good volume of miscellaneous demand for bars is noted from such users as producers of highway sign posts.

Nearby requirements (four to six weeks) can be met in hot and cold finished carbon and alloy bars. The only exceptions are in alloys requiring special treatment. Interest in third quarter requirements is light.

Stainless Steel . . .

Stainless Steel Prices, Page 205

Production of stainless and heat resisting steel ingots in the first quarter totaled 323,003 net tons, reports the American Iron & Steel Institute. This was off slightly from the 360,823 tons produced in the preceding quarter but was up from the 313,334 tons in the first quarter of 1956.

Leading producers of flat-rolled stainless products probably will trim production rates in the third quarter and have plant vacations in July. Orders from auto makers for stainless sheets have declined, although demand remains firm from such users as the dairy, food, chemical, pulp and paper industries. Outlook is for a decline in sales, lasting through the third quarter, until auto makers resume

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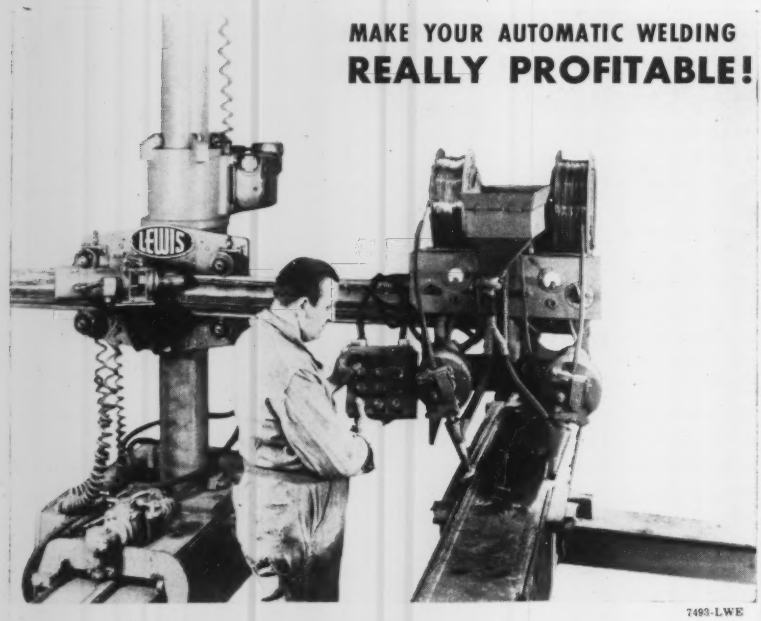

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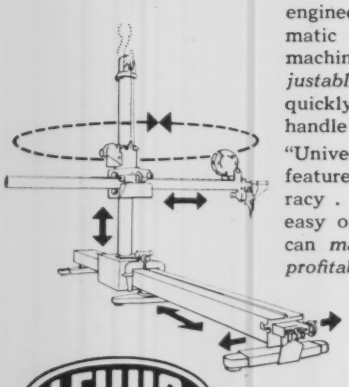

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production on new models. There is little inventory building in anticipation of a price increase.

Wire . . .

Wire Prices, Pages 203 & 204

Wire product bookings are expected to increase next month when some buying will develop in anticipation of price increases in July. Hedge orders are not heavy yet but some consumers are at least filling inventory gaps. More semifinished steel is being offered to wiremakers for delivery next month and will be taken. Production schedules for May for spring, heading and most grades of manufacturers wire are well below capacity.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 202 & 203

June orders for sheets and strip show little improvement over May. Auto makers are continuing to reduce their stocks gradually.

Hedge buying against the possibility of a price increase in July has not been an important factor in the June sales outlook.

Flat-rolled steel producers are expected to reduce operations in the third quarter for plant-wide vacations. They will complete the slowdown in time for an anticipated August pickup in sales.

Galvanized sheet demand appears almost as dull as in the dead of winter, a mystery to most sellers. Housing starts are off, and in some areas farmers do not appear quite as prosperous as they did a year ago. Distributors' inventories haven't been reduced to a point where any important replacement buying is required.

Sellers of cold-rolled sheets have given up hope of any revival in auto specifications for this quarter. In fact, they see little pickup ahead in that direction until late in the third quarter when buying for new models should spurt.

Demand for hot-rolled sheets continues stronger than for cold rolled. Deliveries of hot rolled are more extended than on any other grade, except for one or two specialties, notably high silicon sheets.

Demand for drum steel sheets

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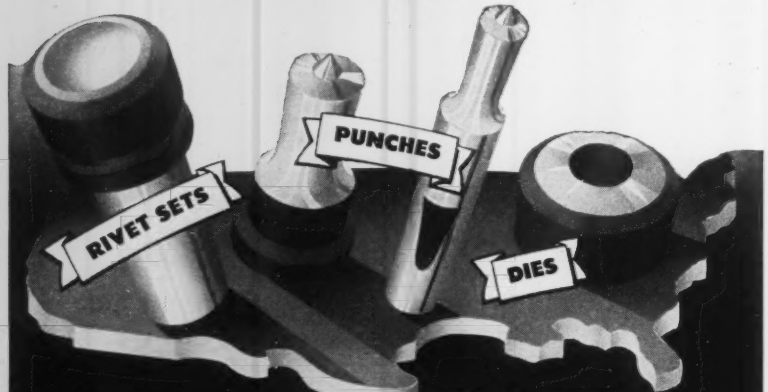

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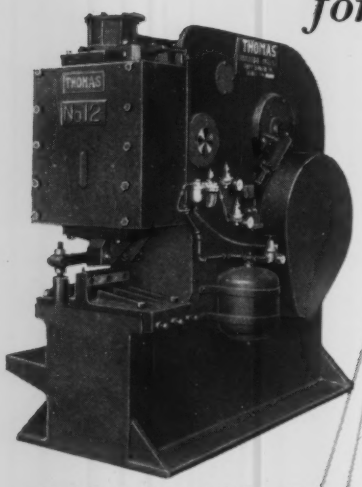

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is increasing, bolstered by inquiry for 500,000 fifty-five gal drums by the Quartermaster General Depot, Columbus, O.

Tin Plate . . .

Tin Plate Prices, Page 203

Tin plate specifications are high and probably will continue so until late in the third quarter, or toward the end of the summer canning season.

Warehouse . . .

Warehouse Prices, Page 206

Demand for warehouse steel is fairly well sustained although some distributors doubt that the May volume will equal that for April. Inventories are increasing in virtually all products with the exception of heavy plates and shapes.

Plates . . .

Plate Prices, Page 201

Supply of light plates has definitely eased. Producers probably will be able to supply strip mill plates through June, as orders for strip have not increased.

Japan is inquiring for 7000 tons of ship plates. She reportedly has set a limit of $180, shipside, for conversion plates, but this is proving to be not enough.

Stainless-clad plate deliveries are improving. Some mills are now promising delivery in eight weeks now that more stainless steel billets are available.

Construction companies, hoping for improvement in supply of plate over ½-in. thick and in wider sizes, received an unpleasant surprise when third quarter allotments were announced. Purchasing agents will not be able to buy as much heavy plate in the third quarter as in the second from most suppliers.

Main reason for the growing shortage is an increase in shipbuilding. Inquiries add up to more tonnage than is available. Requirements are accumulating steadily. Some yards have contracted for conversion tonnage to meet more pressing needs. In general, they are shying away from such transactions because of the excessive cost. One eastern yard has not placed the greater por-

tion of 30,000 tons of plate it has had on inquiry for weeks.

Tubular Goods . . .

Tubular Goods Prices, Page 205

Cast iron pipe sales agencies in the Pacific Northwest are enjoying an active season. Volume is about what it was a year ago. Vancouver, Wash., has placed substantial tonnage with the Pacific States Cast Iron Pipe Co., Portland, Oreg. Bids are in for about 700 tons of 16 and 12-in. pipe at Mukilteo, Wash., and a small tonnage of 10-in. pipe at Kent, Wash. Renton, Wash., is considering proposals for 4500 ft of 6-in. mains.

Producers of oil country tubular products are beginning to fill third quarter order books, but slowly. Customers are selective in their buying and are interested principally in rounding out inventories. They probably will operate through the fourth quarter with lower stocks than they had last year.

Tubemakers plan to fill some smaller orders and serve several new cutomers in an effort to fill their books. They expect to operate at capacity in the third quarter.

Easing in supply of seamless pipe (under 12 in.) will enable producers to meet heavy utility requirements.

Tool Steel . . .

Tool Steel Prices, Page 205

Shipments of high speed and tool steel (excluding hollow drill steel) totaled 10,132 net tons in March, reports the American Iron & Steel Institute. This compares with 9182 tons in February, and with 11,370 tons in March a year ago.

The cumulative movement this year to the end of March was 28,771 net tons, compared with 33,096 in the like quarter year.

Iron Ore . . .

Iron Ore Prices, Page 207

Stocks of iron ore and ore agglomerates on hand on the last day of March totaled 32,479,684 gross tons, reports the Lake Superior Iron Ore Association. This compares with 30,057,448 tons on the like date a year ago.

Receipts of ore in the first three months totaled 10,698,696 tons, against 11,054,371 a year ago.

Consumption of ore in the U.S. and Canada in March amounted to 11,848,680 tons.

In the first three months this year, consumption was 34,833,076 gross tons, compared with 34,472,410 in the like period last year. In the period, U.S. Lake Superior ore consumption was 21,473,027 tons; other U.S. ores, 4,739,086; Canadian Lake Superior, 1,120,029; other Canada, 2,391,305; foreign (except Canada), 5,109,629 tons.

Active blast furnaces in the U.S. and Canada totaled 258 on Mar. 31. On the same date a year ago 253 were in blast. Fifteen stacks are idle.

Shipments of iron ore from the head of the lakes in April totaled 3,986,614 gross tons, reports the Lake Superior Iron Ore Association. This was off 1,687,498 tons from the 5,674,112 tons shipped in April a year ago.

Shipments of Lake Superior iron ore in the week ended May 6 totaled 2,647,880 tons, reports the Lake Superior Iron Ore Association.

Canadian Steel Prices Rise

Canadian iron and steel prices have been raised $4 to $6 a ton. Revised prices, f.o.b. Hamilton, Ont., per 100 lb, are: Plates, $5.45, up 30 cents; hot-rolled sheets, $5, up 20 cents; cold-rolled sheets, $6.35, up 30 cents; porcelain enameling sheets, $7.15, unchanged; hot-rolled strip, $5.30, up 50 cents; cold-rolled strip, $6.65, up 30 cents; galvanized sheets, $6.70, unchanged; bars, $5.15, unchanged.

Revised pig iron prices, f.o.b. Hamilton, per ton, are: Basic iron, $65; foundry iron, $65; malleable iron, $65.50.

Canada . . .

Canadian production of iron and steel is being maintained at high levels. Output of pig iron in February was 291,741 net tons compared with 304,896 in January. Output was 268,457 tons in February, 1956.

February's production of ingots and steel for castings totaled 424,112 net tons. This compares with 467,505 tons in January and

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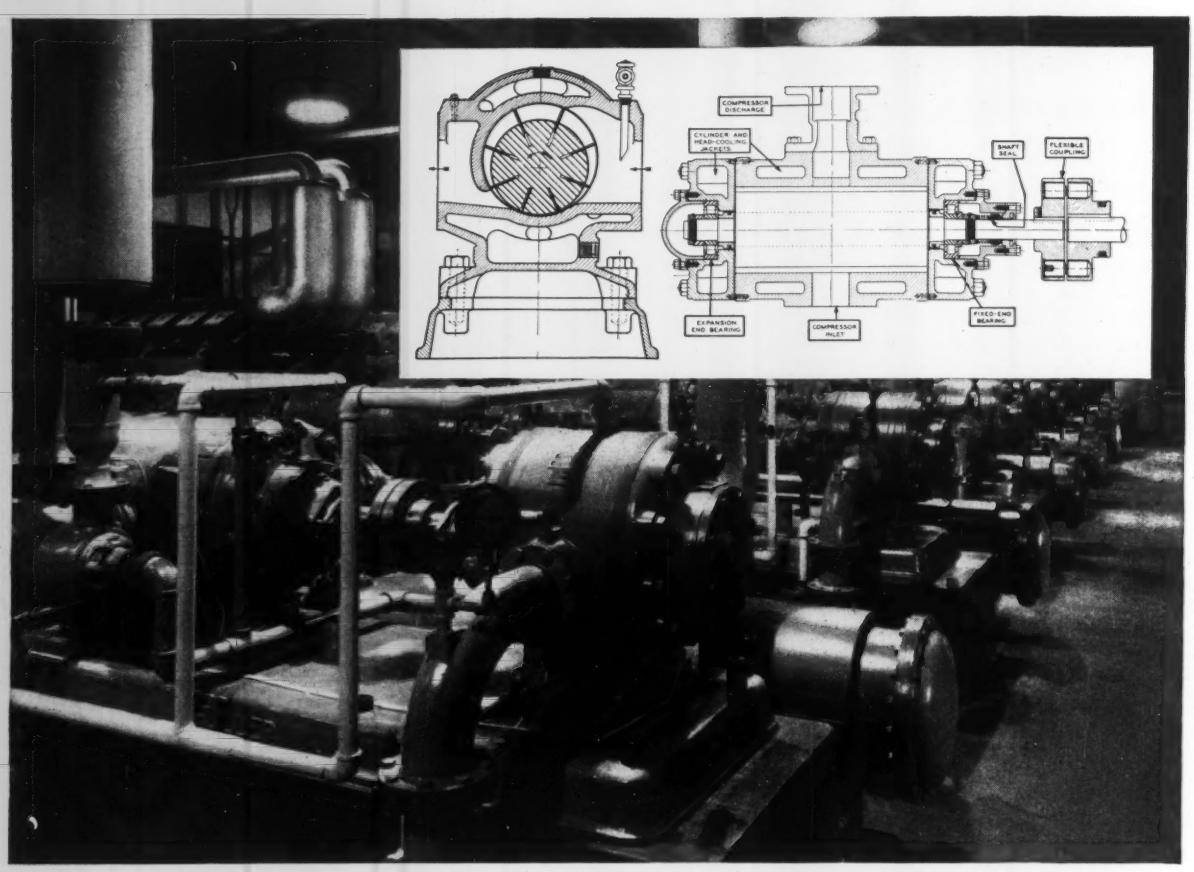

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400,638 tons in February a year ago.

Structural Shapes . . .

Structural Shape Prices, Page 201

Most structural fabricating shops are shipping more tonnage than they are booking. There are two reasons: New bookings are smaller and supply of plain material is improving.

Considerable bridge work is being placed and there is a fair scattering of other jobs, notably schools. Competition, especially among the smaller fabricators who are not equipped to do much in bridge work, is becoming keener.

Wide flange tonnage is still tight, but mills are making shipments closer to promised dates.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

16,500 tons, Southland Center, Dallas, to the American Bridge Division, U.S. Steel Corp., Pittsburgh. Austin Steel Co., Dallas, will furnish 2100 tons of reinforcing bars for the project.

2000 tons, Mt. Tom power plant, Holyoke Water Power Co. Inc., Holyoke, Mass., Haarmann Steel Co., Holyoke; contract direct.

1700 tons, plant addition, Hawthorne Works, Western Electric Co., Chicago, to R. C. Mahone Co., Detroit.

1090 tons, power house, Rocky Reach project, Wenatchee, Wash., to Bethlehem Pacific Coast Steel Corp., Seattle.

585 tons, Montana state bridge at Missoula, to Bethlehem Pacific Coast Steel Corp., Seattle; Pew Construction Co., Missoula, general contractor, awarded at $682,472; 135 tons of reinforcing bars also involved.

450 tons, reinforcing bars and structurals, hospital building, Seymour Johnson AFB, Goldsboro, N. C., to Hall-Hodges Co., Norfolk, Va., (reinforcing) and J. D. Wilkins Co., Goldsboro, (structurals); T. A. Loving & Co., Goldsboro, general contractor.

330 tons, barrack buildings, Naval station, Norfolk, Va., to Globe Iron Works, Norfolk; Virginia Engineering Co. Inc., Newport News Va., general contractor.

220 tons, Good Samaritan Hospital, Lebanon, Pa., to Standard Boiler Works, Lebanon.

200 tons, gymnasium and library, State Teachers College, Worcester, Mass., to Groisser & Shlager Iron Works, Somerville, Mass.; John A. Capobianco Co., Boston, is general contractor.

145 tons, state highway bridge, Quinebaug river, Plainfield-Brooklyn, Conn., to Scherer Steel Co., Hartford, Conn., Halloran Construction Co., Providence, R. I., general contractor; 450 tons, fabricated structural steel, Phoenix Bridge Co., Phoenixville, Pa.

100 tons, composite rolled beam bridge, Torrington, Conn., to Capitol Steel Co., New York; Oneglia & Gervasini, Torrington, general contractor.

100 tons, structurals and bars, building, Griffiss AFB, New York, to the White Plains Iron Works, White Plains, N. Y. (structurals), and Joseph T. Ryerson & Son Inc., Boston, (bars); Beacon Construction Co., Boston, is general contractor.

STRUCTURAL STEEL PENDING

1600 tons, four shelters in various Pacific Northwest areas; bids to U.S. Engineer, Walla Walla, Wash., advanced to May 7.

1370 tons, five grade separation and one stream crossing structure, Norwich, Conn.; bids May 20, Hartford, Conn.; also 460 tons, reinforcing bars and 375 tons steel piles.

1275 tons, bridge structures, Southeast expressway, Braintree-Quincy, Mass.; Marinucci Bros., Inc., Quincy, Mass., low on general contract, $5,729,384.

1030 tons, senior high school, Royersford, Pa.; bids closed.

520 tons, two grade separation structures, College and Chapel streets, New Haven, Conn.; bids May 20, Hartford, Conn.; also 135 tons reinforcing bars and 210 tons mat reinforcement.

500 tons, Warrior River High School, Watsontown, Pa., Ritter Bros., Harrisburg, Pa., general contractor.

500 tons, Lane county courthouse, Eugene, Oreg.; bids May 15.

470 tons, four grade separation structures, Middletown, Conn.; bids May 20, Hartford, Conn.; also 155 tons reinforcing bars and 225 tons mat reinforcement.

400 tons, junior and senior high school, Steelton, Pa., bids May 9.

375 tons, two bridge structures, including four-span 238-ft composite wide flange, Vernon-Guilford, Vt.; bids May 17, Montpelier, Vt.; also 100 tons, reinforcing bars.

300 tons, United Air Lines, hangar expansion, Seattle; John H. Sellen Construction Co., Seattle, is low.

300 tons, senior high school, Glenside, Pa., bids May 21.

300 tons, high school, Elizabethville, Pa., bids May 23.

250 tons, two-span rolled beam bridge and three-span viaduct, Thomaston, Conn.; bids May 20, Hartford, Conn.; also 125 tons reinforcing bars.

250 tons, junior and senior high school, Unionville, Pa., bids May 7.

250 tons, control tower, Newark, N.J., airport for the Port of New York Authority bids Apr. 30.

200 tons, high school, East Greenville, Pa., bids May 7.

200 tons, junior high school, Horsham town-

Aluminum heat exchanger parts are fluxed and brazed at the same time in this 50KW Ajax salt bath furnace. Located at the Trane Company, LaCrosse, Wisconsin, the Ajax furnace brazes completed units in a matter of seconds.

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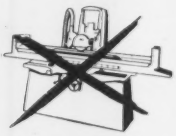

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ship, Pa., bids May 9.

200 tons, office and warehouse, United States Rubber Co., Philadelphia, Irwin & Leighton, Philadelphia, low on general contract.

165 tons, rolled beam composite bridge, Shelton-Derby-Ansonia expressway, Connecticut; bids May 6, Hartford, Conn.

135 tons, state bridge work, Berks county, Pa.; bids May 24.

100 tons or more, 12 draft tube gates, Rocky Reach power project; Consolidated Western Steel Corp., Seattle, low at $404,682.

REINFORCING BARS . . .

REINFORCING BARS PLACED

2100 tons, Southland Center, Dallas, to Austin Steel Co., Dallas; also 16,500 tons of structural steel to the American Bridge Division, U.S. Steel Corp., Pittsburgh.

750 tons, barrack buildings, Naval station, Norfolk, Va., to Hall-Hodges Co., Norfolk; Virginia Engineering Co. Inc., Newport News, Va., general contractor.

175 tons, Washington state bridge, Moses Lake, to Bethlehem Pacific Coast Steel Corp., Seattle; F. R. Hewitt Co., Spokane, Wash., general contractor.

REINFORCING BARS PENDING

2480 tons, highway structures, contracts T-2A, T-2B and T-2C; bids May 16, Illinois State Toll Highway Commission, Chicago.

1740 tons, 2.57 miles of Tri-State route, Northern Illinois toll highway, contract T-6B, Proviso and Leyden townships, Cook county, Ill., for Illinois State Toll Highway Commission, Chicago; bids May 29.

1500 tons, 2.81 miles of Tri-State route, Northern Illinois toll highway, contract T-6C, Proviso township, Cook county, and York township, DuPage county, Ill., for Illinois State Toll Highway Commission, Chicago; bids May 29.

770 tons, 3.385 miles, Northern Illinois toll route, contract T-1A, Thornton township, Cook county, Ill.; for Illinois State Toll Highway Commission, Chicago; bids May 23.

770 tons, high structures, Thornton township, Cook county, Illinois; bids May 23, Illinois State Toll Highway Commission, Chicago.

300 tons, transport building, Boeing Airplane Co., Seattle; bids in.

250 tons, naval installation, Adak, Alaska; general bids in.

250 tons, Washington state slab bridges, Pierce county; bids to Olympia, Wash., May 21.

170 tons, Washington state, three highway spans, Grant county; general contract to the F. R. Hewitt Co., Spokane, Wash., low at $809,965.

165 tons, Washington state highway bridges, Whatcom and Skamania counties; bids to Olympia, Wash., May 21.

150 tons plus, 48-in. concrete siphon, canals and diversion dam, Medford, Oreg.; bids in to the Bureau of Reclamation.

120 tons, Washington state girder bridge, Chelan county; bids to Olympia, Wash., May 21.

115 tons, Washington state, highway span, Snohomish county; general contract to the Harrison Bros. Co. Inc., Tacoma, Wash., low at $712,107.

PLATES . . .

PLATES PLACED

600 tons, 15 tanks, fuel and water storage, various Alaskan military installations, to Wyatt & Kipper, Seattle.

PLATES PENDING

200 tons, water storage tank, Mukilteo, Wash.; Hammond Iron Works, Provo, Utah, low at $80,295.

PIPE . . .

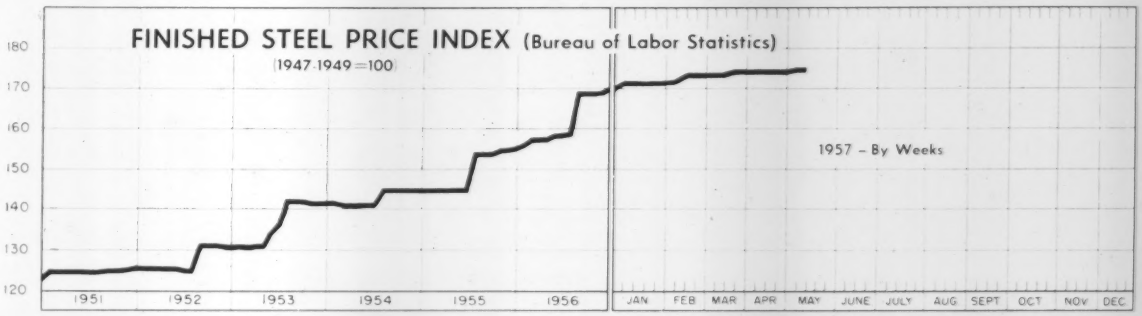
CAST IRON PIPE PLACED

740 tons, two contracts, Tacoma system expansion, to Pacific Cast Iron Pipe Co., Seattle.

CAST IRON PIPE PENDING

700 tons, 16 and 12-in., Mukilteo, Wash.; Frank R. Taylor, Seattle, low at $142,818 and $138,465 on two schedules.

Price Indexes and Composites



May 7, 1957	Week Ago	Month Ago	April Avg.	Year Ago
174.4	174.5	174.0	174.0	157.1

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended May 7

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard, No. 1	$5.350	Bars, Reinforcing	5.788
Rails, Light, 40 lb	6.817	Bars, C.F., Carbon	9.910
Tie Plates	6.275	Bars, C.F., Alloy	13.425
Axles, Railway	9.400	Bars, C.F., Stainless, 302 (lb)	0.533
Wheels, Freight Car, 33 in. (per wheel)	57.50	Sheets, H.R., Carbon	5.945
Plates, Carbon	5.900	Sheets, C.R., Carbon	6.789
Structural shapes	5.667	Sheets, Galvanized	8.070
Bars, Tool Steel, Carbon (lb)	0.480	Sheets, C.R., Stainless, 302 (lb)	0.660
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.585	Sheets, Electrical	11.225
Bars, Tool Steel, H.R., Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.60 (lb)	1.274	Strip, C.R., Carbon	8.843
Bars, Tool Steel, H.R., Alloy, High Speed, W18, Cr 4, V 1 (lb)	1.769	Strip, C.R., Stainless, 430 (lb)	0.475
Bars, H.R., Alloy	10.150	Strip, H.R., Carbon	6.000
Bars, H.R., Stainless, 303 (lb)	0.508	Pipe, Black, Buttweld (100 ft)	18.894
Bars, H.R., Carbon	6.075	Pipe, Galv., Buttweld (100 ft)	22.688
		Pipe, Line (100 ft)	190.108
		Casing, Oil Well, Carbon (100 ft)	185.566
		Casing, Oil Well, Alloy (100 ft)	288.980
Tubes, Boiler (100 ft)	46.737	Black Plate, Canmaking Quality (95 lb base box)	7.583
Tubing, Mechanical, Carbon (100 ft)	23.713	Wire, Drawn, Carbon	9.775
Tubing, Mechanical, Stainless, 304 (100 ft)	197.663	Wire, Drawn, Stainless, 430 (lb)	0.630
Tin Plate, Hot-dipped, 1.25 lb (95 lb base box)	9.783	Bale Ties (bundle)	7.400
Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.483	Nails, Wire, 8d Common	9.365
		Wire, Barbed (80-rod spool)	8.412
		Woven Wire Fence (20-rod roll)	20.505

STEEL's FINISHED STEEL PRICE INDEX*

	May 8 1957	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	228.59	228.59	227.41	210.45	171.92
Index in cents per lb	6.193	6.193	6.161	5.701	4.657

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT	$140.24	$140.24	$139.71	$128.98	$106.32
No. 2 Fdry Pig Iron, GT	64.70	64.70	64.70	60.27	52.54
Basic Pig Iron, GT	64.23	64.23	64.23	59.80	52.16
Malleable Pig Iron, GT	65.77	65.77	65.77	61.27	53.27
Steelmaking Scrap, GT	43.67	43.67	44.00	53.00	43.00

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	May 8 1957	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.075	5.075	5.075	4.65	3.70
Bars, H.R., Chicago	5.075	5.075	5.075	4.65	3.70
Bars, H.R., deld., Philadelphia	5.365	5.365	5.365	4.93	4.223
Bars, C.F., Pittsburgh	6.85*	6.85*	6.85*	6.25*	4.55
Shapes, Std., Pittsburgh	5.00	5.00	5.00	4.60	3.65
Shapes, Std., Chicago	5.00	5.00	5.00	4.60	3.65
Shapes, deld., Philadelphia	5.31	5.31	5.31	5.00	3.918
Plates, Pittsburgh	4.85	4.85	4.85	4.50	3.70
Plates, Chicago	4.85	4.85	4.85	4.50	3.70
Plates, Coatesville, Pa.	5.25	5.25	5.25	4.80	4.15
Plates, Sparrows Point, Md.	4.85	4.85	4.85	4.50	3.70
Plates, Claymont, Del.	5.70	5.70	5.70	5.35	4.15
Sheets, H.R., Pittsburgh	4.675	4.675	4.675	4.325	3.60-3.75
Sheets, H.R., Chicago	4.675	4.675	4.675	4.325	3.60
Sheets, C.R., Pittsburgh	5.75	5.75	5.75	5.325	4.35
Sheets, C.R., Chicago	5.75	5.75	5.75	5.325	4.35
Sheets, C.R., Detroit	5.75-5.85	5.75-5.85	5.75-5.85	5.325-5.425	4.55
Sheets, Galv., Pittsburgh	6.30	6.30	6.30	5.85	4.80
Strip, H.R., Pittsburgh	4.675	4.675	4.675	4.325	3.75-4.00
Strip, H.R., Chicago	4.675	4.675	4.675	4.325	3.50
Strip, C.R., Pittsburgh	6.85	6.85	6.85	6.25	4.65-5.35
Strip, C.R., Chicago	6.85	6.85	6.85	6.25-6.35	4.90
Strip, C.R., Detroit	6.95	6.95	6.95	6.35	4.85-5.60
Wire, Basic, Pittsburgh	7.20	7.20	7.20	6.60	4.85-5.10
Nails, Wire, Pittsburgh	8.49	8.49	8.49	7.60	5.90-6.20
Tin plate (1.50 lb) box, Pitts.	$10.30	$10.30	$9.95	$9.85	$8.70

*Including 0.35c for special quality.

SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$91.50	$91.50	$91.50	$84.50	$66.00
Wire rods, 7/32-5/8" Pitts.	5.80	5.80	5.80	5.375	4.10-4.30

PIG IRON, Gross Ton	May 8 1957	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pitts.	$65.50	$65.50	$65.50	$61.00	$53.00
Basic, Valley	64.50	64.50	64.50	60.00	52.00
Basic, deld., Phila.	68.38	68.38	68.38	63.76	56.61
No. 2 Fdry, NevilleIsland, Pa.	65.00	65.00	65.00	60.50	52.50
No. 2 Fdry, Chicago	65.00	65.00	65.00	60.50	52.50
No. 2 Fdry, deld., Phila.	68.88	68.88	68.88	64.26	57.11
No. 2 Fdry, Birm.	59.00	59.00	59.00	55.00	48.88
No. 2 Fdry (Birm.) deld. Cin.	66.70	66.70	66.70	62.70	55.49
Malleable, Valley	65.00	65.00	65.00	60.50	52.50
Malleable, Chicago	65.00	65.00	65.00	60.50	52.50
Ferromanganese, Duquesne	255.00†	255.00†	255.00†	215.00†	188.00*

†74-76% Mn, net ton. *75-82% Mn, gross ton, Etna, Pa.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$44.50	$43.50	$42.50	$51.50	$44.00
No. 1 Heavy Melt, E. Pa.	49.00	48.00	48.50	56.00	42.50
No. 1 Heavy Melt, Chicago	39.50	39.50	41.00	51.50	42.50
No. 1 Heavy Melt, Valley	41.50	41.50	39.50	57.50	44.00
No. 1 Heavy Melt, Cleve.	38.50	38.50	37.00	54.50	43.00
No. 1 Heavy Melt, Buffalo	41.50	41.50	41.50	53.50	43.00
Rails, Rerolling, Chicago	56.50	56.50	54.50	72.50	52.50
No. 1 Cast, Chicago	39.50	39.50	39.50	52.50	49.00

COKE, Net Ton					
Beehive, Furn., Connlsvl.	$15.25	$15.25	$15.25	$14.125	$14.75
Beehive, Fdry., Connlsvl.	18.00	18.00	18.00	16.50	17.50

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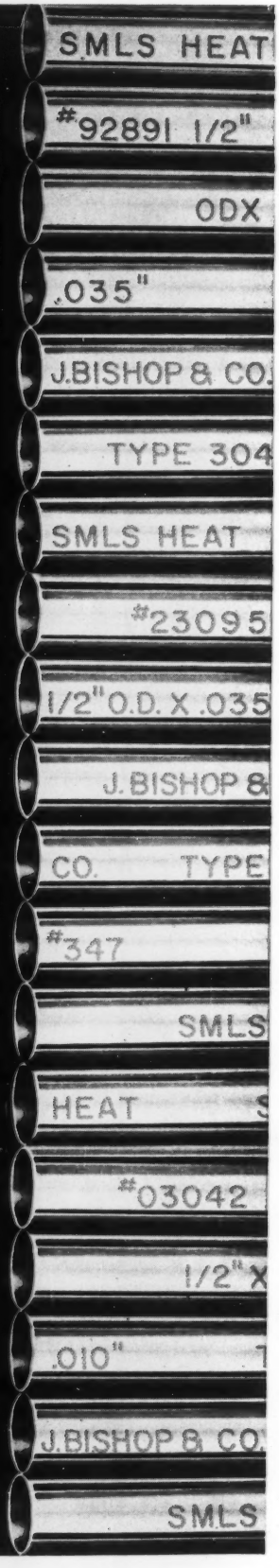

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STAINLESS STEEL PRODUCTS DIVISION
J. BISHOP & CO. Platinum Works
Malvern, Pennsylvania

Steel Prices

Mill prices as reported to STEEL, May 8, cents per pound except as otherwise noted. *Changes shown in italics.* Code numbers following mill points indicate producing company. Key to producers, page 202; to footnotes, page 204.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)

Munhall,Pa. U5 ..... $70.50

INGOTS, Alloy (NT)

Detroit R7 ..... $74.00
Houston S5 ..... 74.00
Midland,Pa. C18 ..... 74.00
Munhall,Pa. U5 ..... 74.00

BILLETS, BLOOMS & SLABS Carbon, Rerolling (NT)

Bessemer,Pa. U5 ....$74.00
Bridgeport,Conn. N19 ..79.00
Buffalo R2 ..... 74.00
Clairton,Pa. U5 ..... 74.00
Ensley,Ala. T2 ..... 74.00
Fairfield,Ala. T2 ..... 74.00
Fontana,Calif. K1 ....83.50
Gary,Ind. U5 ..... 74.00
Johnstown,Pa. B2 ..... 74.00
Lackawanna,N.Y. B2 . 74.00
LoneStar,Tex. L6 ....80.00
Munhall,Pa. U5 ..... 74.00
S.Chicago,Ill. R2, U5 .74.00
S.Duquesne,Pa. U5 ...74.00
Sterling, Ill. N15 .....74.00
Youngstown R2 ..... 74.00

Carbon, Forging (NT)

Bessemer,Pa. U5 ....$91.50
Bridgeport,Conn. N19 ..96.50
Buffalo R2 ..... 91.50
Canton,O. R2 ..... 94.00
Clairton,Pa. U5 ..... 91.50
Conshohocken,Pa. A3 ..96.50
Ensley,Ala. T2 ..... 91.50
Fairfield,Ala. T2 ..... 91.50
Fontana,Calif. K1 ....101.00
Gary,Ind. U5 ..... 91.50
Geneva,Utah C11 ..... 91.50
Houston S5 ..... 96.50
Johnstown,Pa. B2 ..... 91.50
Lackawanna,N.Y. B2 . 91.50
LosAngeles B3 ..... 101.00
Midland,Pa. C18 ..... 91.50
Munhall,Pa. U5 ..... 91.50
Seattle B3 ..... 105.00
S.Chicago R2, U5, W14 91.50
S.Duquesne,Pa. U5 ... 91.50
S.SanFrancisco B3 ...101.00

Alloy, Forging (NT)

Bethlehem,Pa. B2 ..$107.00
Bridgeport,Conn. N19.107.00
Buffalo R2 ..... 107.00
Canton,O. R2 ..... 107.00
Conshohocken,Pa. A3 .114.00
Detroit R7 ..... 107.00
Fontana,Calif. K1 ....128.00
Gary,Ind. U5 ..... 107.00
Houston S5 ..... 112.00
Ind.Harbor,Ind. Y1 ..107.00
Johnstown,Pa. B2 ..... 107.00
Lackawanna,N.Y. B2.107.00
LosAngeles B3 ..... 127.00
Massillon,O. R2 ....107.00
Midland,Pa. C18 ..... 107.00
Munhall,Pa. U5 ..... 107.00
S.Chicago R2,U5,W14 .107.00
S.Duquesne,Pa U5 ..107.00
Struthers,O. Y1 ..... 107.00
Warren,O. C17 ..... 107.00

ROUNDS, SEAMLESS TUBE (NT)

Bridgeport,Conn. N19 $116.50
Buffalo R2 ..... 111.50
Canton,O. R2 ..... 114.00
Cleveland,O. R2 ..... 111.50
Gary,Ind. U5 ..... 111.50
S.Chicago,Ill. R2, W14.111.50
S.Duquesne,Pa. U5 ..111.50

SKELP

Aliquippa,Pa. J5 ..... 4.725
LoneStar,Tex. L6 ....5.025
Munhall,Pa. U5 ..... 4.625
Warren,O. R2 ..... 4.625
Youngstown R2, U5 ..4.625

WIRE RODS

AlabamaCity,Ala. R2 ..5.80
Aliquippa,Pa. J5 ..... 5.80
Alton,Ill. L1 ..... 6.00
Buffalo W12 ..... 5.80
Cleveland A7 ..... 5.80
Donora,Pa. A7 ..... 5.80
Fairfield,Ala T2 ..... 5.80
Houston S5 ..... 6.05
IndianaHarbor,Ind. Y1 .5.80
Johnstown,Pa. B2 ..... 5.80
Joliet,Ill. A7 ..... 5.80
KansasCity,Mo. S5 .... 6.05
Kokomo,Ind. C16 ..... 5.90
LosAngeles B3 ..... 6.60
Minnequa,Colo. C10 .... 6.05
Monessen,Pa. P17 ..... 5.80
N.Tonawanda,N.Y. B11 .5.80
Pittsburg,Calif. C11 .... 6.60
Portsmouth,O. P12 .... 5.80
Roebling,N.J. R5 ..... 5.90
S.Chicago,Ill. R2 ..... 5.80
SparrowsPoint,Md. B2 ..5.90
Sterling,Ill.(1) N15 ....5.80
Sterling,Ill. N15 ..... 5.90
Struthers,O. Y1 ..... 5.80
Worcester,Mass. A7 .... 6.10

STRUCTURALS

Carbon Steel Std. Shapes

Ala.City,Ala. R2 ..... 5.00
Atlanta A11 ..... 5.20
Aliquippa,Pa. J5 ..... 5.00
Bessemer,Ala T2 ..... 5.00
Bethlehem,Pa. B2 ..... 5.05
Birmingham C15 ..... 5.00
Clairton,Pa. U5 ..... 5.00
Fairfield,Ala T2 ..... 5.00
Fontana,Calif. K1 .... 5.75
Gary,Ind. U5 ..... 5.00
Geneva,Utah C11 ..... 5.00
Houston S5 ..... 5.10
Ind.Harbor,Ind. I-2 .... 5.00
Johnstown,Pa. B2 ..... 5.05
Joliet,Ill. P22 ..... 5.00
KansasCity,Mo. S5 .... 5.10
Lackawanna,N.Y. B2 .. 5.05
LosAngeles B3 ..... 5.70
Minnequa,Colo. C10 .... 5.30
Munhall,Pa. U5 ..... 5.00
Niles,Calif. P1 ..... 5.65
Phoenixville,Pa. P4 .... 5.85
Portland,Oreg. O4 .... 5.75
Seattle B3 ..... 5.75
S.Chicago,Ill. U5, W14..5.00
S.SanFrancisco B3 .... 5.65
Sterling,Ill. N15 ..... 5.00
Torrance,Calif. C11 .... 5.70
Weirton,W.Va. W6 .... 5.00

Wide Flange

Bethlehem,Pa. B2 .... 5.05
Clairton,Pa. U5 ..... 5.00
Fontana,Calif. K1 .... 5.90
IndianaHarbor,Ind. I-2 .5.25
Lackawanna,N.Y. B2 .. 5.05
Munhall,Pa. U5 ..... 5.00
Phoenixville,Pa. P4 ... 5.85
S.Chicago,Ill. U5 ..... 5.00

Alloy Std. Shapes

Aliquippa,Pa. J5 ..... 6.20
Clairton,Pa. U5 ..... 6.20
Gary,Ind. U5 ..... 6.20
Houston S5 ..... 6.30
Munhall,Pa. U5 ..... 6.20
S.Chicago,Ill. U5 ..... 6.20

H.S., L.A. Std. Shapes

Aliquippa,Pa. J5 ..... 7.35
Bessemer,Ala. T2 ..... 7.35
Bethlehem,Pa. B2 ..... 7.40
Clairton,Pa. U5 ..... 7.35
Fairfield,Ala. T2 ..... 7.35
Fontana,Calif. K1 .... 8.10
Gary,Ind. U5 ..... 7.35
Geneva,Utah C11 .... 7.35
Houston S5 ..... 7.45
Ind.Harbor,Ind. I-2, Y1.7.35
Johnstown,Pa. B2 ..... 7.40
KansasCity,Mo. S5 .... 7.45
Lackawanna,N.Y. B2 .. 7.40
LosAngeles B3 ..... 8.05
Munhall,Pa. U5 ..... 7.35
Seattle B3 ..... 8.10
S.Chicago,Ill. U5, W14..7.35
S.SanFrancisco B3 .... 8.00
Struthers,O. Y1 ..... 7.35

H.S., L.A. Wide Flange

Bethlehem,Pa. B2 ..... 7.40
Lackawanna,N.Y. B2 .. 7.40
Munhall,Pa. U5 ..... 7.35
S.Chicago,Ill. U5 ..... 7.35

PILING

BEARING PILES

Bethlehem,Pa. B2 ..... 5.05
Lackawanna,N.Y. B2 .. 5.05
Munhall,Pa. U5 ..... 5.00
S.Chicago,Ill. U5 ..... 5.00

STEEL SHEET PILING

Lackawanna, N.Y. B2 ..5.90
Munhall,Pa. U5 ..... 5.90
S.Chicago, Ill. U5 ..... 5.90

PLATES

PLATES, Carbon Steel

Ala.City,Ala. R2 ..... 4.85
Aliquippa,Pa. J5 ..... 4.85
Ashland,Ky.(15) A10 ..4.85
Bessemer,Ala. T2 ..... 4.85
Clairton,Pa. U5 ..... 4.85
Claymont,Del. C22 .... 5.70
Cleveland J5, R2 ..... 4.95
Coatesville,Pa. L7 ..... 5.25
Conshohocken,Pa. A3 ..4.95
Detroit M1 ..... 4.95
Ecorse,Mich. G5 ..... 4.95
Fairfield,Ala. T2 ..... 4.85
Fontana,Calif.(30) K1 ..5.60
Gary,Ind. U5 ..... 4.85
Geneva,Utah C11 ..... 4.85
GraniteCity,Ill. G4 .... 5.05
Harrisburg,Pa. P4 ..... 5.80
Houston S5 ..... 4.95
Ind.Harbor,Ind. I-2, Y1 4.85
Johnstown,Pa. B2 ..... 4.85
Lackawanna,N.Y. B2 ..4.85
LoneStar,Tex. L6 ..... 5.20
Minnequa,Colo. C10 .... 5.70
Munhall,Pa. U5 ..... 4.85
Newport,Ky. A2 ..... 4.85
Pittsburgh J5 ..... 4.85
Riverdale,Ill. A1 ..... 4.85
Seattle B3 ..... 5.75
Sharon,Pa. S3 ..... 4.85
S.Chicago,Ill. U5, W14 4.85
SparrowsPoint,Md. B2.. 4.85
Sterling,Ill. N19 ..... 4.85
Steubenville,O. W10 .... 4.85
Warren,O. R2 ..... 4.85
Youngstown R2, U5, Y1.4.85

PLATES, Carbon Abras. Resist.

Claymont,Del. C22 .... 6.20
Fontana,Calif. K1 ..... 7.00
Geneva,Utah C11 ..... 6.25
Johnstown,Pa. B2 ..... 5.65
SparrowsPoint,Md. B2 .. 5.65

PLATES, Wrought Iron

Economy,Pa. B14 .... 11.95

PLATES, H.S., L.A.

Aliquippa,Pa. J5 ..... 7.25
Bessemer,Ala. T2 ..... 7.25
Clairton,Pa. U5 ..... 7.25
Claymont,Del. C22 ..... 7.55
Cleveland J5, R2 ..... 7.25
Coatesville,Pa. L7 ..... 7.55
Conshohocken,Pa. A3 ..7.25
Ecorse,Mich. G5 ..... 7.35
Fairfield,Ala. T2 ..... 7.25
Fontana,Calif.(30) K1..8.00
Gary,Ind. U5 ..... 7.25
Geneva,Utah C11 ..... 7.25
Houston S5 ..... 7.35
Ind.Harbor,Ind. I-2, Y1..7.25
Johnstown,Pa. B2 ..... 7.25
Munhall,Pa. U5 ..... 7.25
Pittsburgh J5 ..... 7.25
Seattle B3 ..... 8.15
Sharon,Pa. S3 ..... 7.25
S.Chicago,Ill. U5, W14..7.25
SparrowsPoint,Md. B2 ..7.25
Warren,O. R2 ..... 7.25
Youngstown U5, Y1 .... 7.25

PLATES, Alloy

Aliquippa,Pa. J5 ..... 6.85
Claymont,Del. C22 .... 6.85
Coatesville,Pa. L7 ..... 6.85
Fontana,Calif.(30) K1 ..7.60
Gary,Ind. U5 ..... 6.85
Houston S5 ..... 6.95
Ind.Harbor,Ind. Y1 .... 6.85
Johnstown,Pa. B2 ..... 6.85
Munhall,Pa. U5 ..... 6.85
Newport,Ky. A2 ..... 6.85
Pittsburgh J5 ..... 6.85
Seattle B3 ..... 7.75
Sharon,Pa. S3 ..... 6.85
S.Chicago,Ill. U5, W14..6.85
SparrowsPoint,Md. B2 .. 6.85
Youngstown Y1 ..... 6.85

FLOOR PLATES

Cleveland J5 ..... 5.925
Conshohocken,Pa. A3 ..5.925
Harrisburg,Pa. P4 .... 6.275
Ind.Harbor,Ind. I-2 ..5.925
Munhall,Pa. U5 ..... 5.925
S.Chicago,Ill. U5 ..... 5.925

PLATES, Ingot Iron

Ashland c.l. (15) A10..5.10
Ashland l.c.l. (15) A10..5.60
Cleveland c.l. R2 ..... 5.60
Warren,O. c.l. R2 ..... 5.60

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)

Ala.City,Ala.(9) R2 ..5.075
Aliquippa,Pa.(9) J5 ....5.075
Alton,Ill. L1 ..... 5.275
Atlanta(9) A11 ..... 5.275
Bessemer,Ala.(9) T2 ..5.075
Birmingham(9) C15 ..5.075
Bridgeport,Conn. N19 ..5.30
Buffalo(9) R2 ..... 5.075
Clairton,Pa.(9) U5 ....5.075
Cleveland(9) R2 ..... 5.075
Ecorse,Mich.(9) G5 ....5.175
Emeryville,Calif. J7 ..5.825
Fairfield,Ala.(9) T2 ..5.075
Fairless,Pa. (9) U5 ....5.225
Fontana,Calif.(9) K1 ..5.775
Gary,Ind.(9) U5 ..... 5.075
Houston(9) S5 ..... 5 325
Ind.Harbor(9) I-2, Y1..5.075
Johnstown,Pa.(9) B2 ..5.075
Joliet,Ill. P22 ..... 5.075
KansasCity,Mo.(9) S5..5.325
Lackawanna(9) B2 ....5.075
LosAngeles(9) B3 ....5.775
Milton,Pa. M18 ..... 5.225
Minnequa,Colo. C10 ...5.525
Niles,Calif. P1 ..... 5.775
N.T'wanda,N.Y.(9)B11 5.425
Pittsburg,Calif.(9) C11.5.775
Pittsburgh(9) J5 ..... 5.075
Portland,Oreg. O4 ....5.825
Seattle B3, N14 ..... 5.825
S.Ch'c'go(9)R2,U5,W14 5.075
S.Duquesne,Pa.(9) U5..5.075
S.SanFran.,Calif.(9)B3 5.825
Sterling,Ill.(1) N15 ....5.075
Sterling,Ill. N15 ..... 5.175
Struthers,O. Y1 ..... 5.075
Tonawanda,N.Y. B12 ..5.45
Torrance,Calif.(9) C11 5.775
Youngstown (9) R2, U5 5.075

BARS, H.R. Leaded Alloy (Including leaded extra)

Warren,O. C17 ..... 7.125

BARS, Hot-Rolled Alloy

Aliquippa,Pa. J5 ..... 6.125
Bethlehem,Pa. B2 .... 6.125
Bridgeport,Conn. N19 ..6.20
Buffalo R2 ..... 6.125
Canton,O. R2 ..... 6.125
Clairton,Pa. U5 ..... 6.125
Detroit R7 ..... 6.125
Ecorse,Mich. G5 ..... 6.225
Fairless,Pa. U5 ..... 6.275
Fontana,Calif. K1 .... 7.175
Gary,Ind. U5 ..... 6.125
Houston S5 ..... 6.375
Ind.Harbor,Ind. I-2, Y1.6.125
Johnstown,Pa. B2 .... 6.125
KansasCity,Mo. S5 .... 6.375
Lackawanna,N.Y. B2 ..6.125
LosAngeles B3 ..... 7.175
Massillon,O. R2 ..... 6.125
Midland,Pa. C18 ..... 6.125
Pittsburgh J5 ..... 6.125
S.Chicago R2,U5,W14 ..6.125
S.Duquesne,Pa. U5 .... 6.125
Struthers,O. Y1 ..... 6.125
Warren,O. C17 ..... 6.125
Youngstown U5 ..... 6.125

BARS & SMALL SHAPES, H.R. High-Strength Low-Alloy

Aliquippa,Pa. J5 ..... 7.425
Bessemer,Ala. T2 ..... 7.425
Bethlehem,Pa. B2 ..... 7.425
Bridgeport,Conn. N19 ..7.50
Clairton, Pa. U5 ..... 7.425
Cleveland R2 ..... 7.425
Ecorse,Mich. G5 ..... 7.525
Fairfield,Ala. T2 ..... 7.425
Fontana,Calif. K1 .... 8.125
Gary,Ind. U5 ..... 7.425
Houston S5 ..... 7.675
Ind.Harbor,Ind. Y1 .... 7.425
Johnstown,Pa. B2 ..... 7.425
KansasCity,Mo. S5 .... 7.675
Lackawanna,N.Y. B2 .. 7.425
LosAngeles B3 ..... 8.125
Pittsburgh J5 ..... 7.425
Seattle B3 ..... 8.175
S.Chicago,Ill. U5, W14..7.425
S.Duquesne,Pa. U5 .... 7.425
S.SanFrancisco B3 .... 8.175
Struthers,O. Y1 ..... 7.425
Youngstown U5 ..... 7.425

BAR SIZE ANGLES; H.R. Carbon

Bethlehem,Pa.(9) B2...5.225
Houston(9) S5 ..... 5.325
KansasCity,Mo.(9) S5..5.325
Lackawanna(9) B2 ....5.075
Sterling,Ill. N15 ..... 5.175
Sterling Ill.(1) N15 ....5.075
Tonawanda,N.Y. B12 ...5.45

BAR SIZE ANGLES; S. Shapes

Aliquippa,Pa. J5 ..... 5.075
Atlanta A11 ..... 5.575
Joliet,Ill P22 ..... 5.075
Niles,Calif. P1 ..... 5.85
Pittsburgh J5 ..... 5.075
Portland,Oreg. O4 ..... 5.85
SanFrancisco S7 ..... 5.95

BAR SHAPES, Hot-Rolled Alloy

Aliquippa,Pa. J5 ..... 6.20
Clairton,Pa. U5 ..... 6.20
Gary,Ind. U5 ..... 6.20
Houston S5 ..... 6.45
KansasCity,Mo. S5 ..... 6.45
Pittsburgh J5 ..... 6.20
Youngstown U5 ..... 6.20

BARS, C.F., Leaded Alloy (Including leaded extra)

Ambridge,Pa. W18 ....9.475
BeaverFalls,Pa. M12 ..9.475
Chicago W18 ..... 9.475
Cleveland C20 ..... 9.475
LosAngeles S30 ..... 11.10
LosAngeles P2 ..... 11.35
Monaca,Pa. S17 ..... 9.475
Newark,N.J. W18 ..... 9.65
Warren,O. C17 ..... 9.475

BARS, Cold-Finished Carbon

Ambridge,Pa. W18 ..... 6.85
BeaverFalls,Pa. M12,R2.6.85
Birmingham C15 ..... 7.45
Bridgeport,Conn. N19 ..7.20
Buffalo B5 ..... 6.90
Camden,N.J. P13 ..... 7.30
Carnegie,Pa. C12 ..... 6.85
Chicago W18 ..... 6.85
Cleveland A7, C20 ..... 6.85
Detroit B5, P17 ..... 7.05
Detroit R7 ..... 6.85
Donora,Pa. W8 ..... 6.85
Elyria,O. W8 ..... 6.85
FranklinPark,Ill. N5 ... 6.85
Gary,Ind. U5 ..... 6.85
GreenBay,Wis. F7 ..... 6.85
Hammond,Ind. L2, M13.6.85
Hartford,Conn. R2 ..... 7.35
Harvey,Ill. B5 ..... 6.85
LosAngeles(49) S30 ....8.30
LosAngeles R2 ..... 8.75
LosAngeles P2 ..... 8.30
Mansfield,Mass. B5 .... 7.40
Massillon,O. R2, R8 ...6.85
Midland,Pa. C18 ..... 6.85
Monaca,Pa. S17 ..... 6.85
Newark,N.J. W18 ..... 7.30
NewCastle,Pa.(17) B4 ..6.85
Pittsburgh J5 ..... 6.85
Plymouth,Mich. P5 ..... 7.10
Putnam,Conn. W18 .... 7.40
Readville,Mass. C14 .... 7.40
S.Chicago,Ill. W14 ..... 6.85
SpringCity,Pa. K3 ..... 7.30
Struthers,O. Y1 ..... 6.85
Waukegan,Ill. A7 ..... 6.85
Youngstown F3, Y1 .... 6.85

BARS, Cold-Finished Carbon (Turned and Ground)

Cumberland,Md.(5) C19..6.10

BARS, Cold-Finished Alloy

Ambridge,Pa. W18 .... 8.325
BeaverFalls,Pa. M12,R2 8.325
Bethlehem,Pa. B2 ..... 8.325
Bridgeport,Conn. N19 ..8.475
Buffalo B5 ..... 8.325
Camden,N.J. P13 ..... 8.50
Canton,O. T7 ..... 8.325
Carnegie,Pa. C12 ..... 8.325
Chicago W18 ..... 8.325
Cleveland A7, C20 ....8.325
Detroit B5, P17 ..... 8.525
Detroit R7 ..... 8.325
Donora,Pa. A7 ..... 8.325
Elyria,O. W8 ..... 8.325
FranklinPark,Ill. N5 ..8.325
Gary,Ind. R2 ..... 8.325
GreenBay,Wis. F7 ..... 8.325
Hammond,Ind. L2,M13 8.325
Hartford,Conn. R2 ....8.625
Harvey,Ill. B5 ..... 8.325
Lackawanna,N.Y. B2 ..8.325
LosAngeles S30 ..... 10.10
LosAngeles P2 ..... 10.20
Mansfield,Mass. B5 ....8.625
Massillon,O. R2, R8 ...8.325
Midland,Pa. C18 ..... 8.325
Monaca,Pa. S17 ..... 8.325
Newark,N.J. W18 ..... 8.50
Plymouth,Mich. P5 ....8.525
S.Chicago W14 ..... 8.325
SpringCity,Pa. K3 ..... 8.50
Struthers,O. Y1 ..... 8.325
Warren,O. C17 ..... 8.325
Waukegan,Ill. A7 ..... 8.325
Worcester,Mass. A7 ...8.625
Youngstown F3, Y1 ...8.325

BARS, Reinforcing (To Fabricators)

Ala.City,Ala. R2 ..... 5.075
Atlanta A11 ..... 5.275
Birmingham C15 ..... 5.075
Bridgeport,Conn. N9 ...5.30
Buffalo R2 ..... 5.075
Cleveland R2 ..... 5.075
Ecorse,Mich. G5 ..... 5.425
Emeryville,Calif. J7 ..5.825

Fairfield,Ala. T2 ....5.075
Fairless,Pa. U5 .....5.225
Fontana,Calif. K1 ....5.775
Ft.Worth,Tex. (4) T4..5.525
Gary,Ind U5 .....5.075
Houston S5 .....5.325
Ind.Harbor,Ind. I-2 Y1 5.075
Johnstown,Pa. B2 ....5.075
Joliet,Ill. P22 .....5.075
KansasCity,Mo. S5 ....5.325
Lackawanna,N.Y. B2..5.075
LosAngeles B3 .....5.775
Milton,Pa. M18 .....5.225
Minnequa,Colo. C10 ...5.525
Niles,Calif. P1 .....5.775
Pittsburg,Calif. C11 ..5.775
Pittsburgh J5 .....5.075
Portland,Oreg. O4 ...5.825
SandSprings,Okla. S5 ..5.575
Seattle B3, N14 .....8.825
S.Chicago,Ill. R2 ....5.075
S.Duquesne,Pa. U5 ....5.075
S.SanFrancisco B3 ....5.825
SparrowsPoint,Md. B2 .5.075
Sterling,Ill.(1) N15 ..5.075
Sterling,Ill. N15 .....5.175
Struthers,O. Y1 .....5.075
Tonawanda,N.Y. B12 ..5.65
Torrance,Calif. C11 ..5.775
Youngstown R2, U5 ..5.075

BARS, Reinforcing (Fabricated; to Consumers)
Boston B2 .....7.30
Chicago U8 .....6.81
Cleveland U8 .....6.79
Johnstown,Pa. ¼-1" B2 6.73
KansasCity,Mo. S5 ....7.00
Lackawanna,N.Y. B2 ..6.50
Marion,O. P11 .....6.70
New York U8 .....7.20
Pittsburgh J5, U8 .....6.75
Seattle B3, N14 .....7.20
SparrowsPt. ¼-1" B2 ..6.73
Williamsport,Pa. S19 ..6.65

RAIL STEEL BARS
ChicagoHts.(3) C2, I-2 5.075
ChicagoHts.(4)(44) I-2 5.075
ChicagoHts.(4) C2 ....5.075
Ft.Worth,Tex.(26) T4..5.525
Franklin,Pa.(3) F5 ....5.10
Franklin,Pa.(4) F5 ....5.075
JerseyShore,Pa.(4) J8 ..5.10
Marion,O.(3) P11 .....5.10
Moline,Ill.(3) R2 ....5.225
Tonawanda(3) B12 ....5.15
Tonawanda(4) B12 ....5.65
Williamsport,Pa.(3) S19 5.15

BARS, Wrought Iron
Economy,Pa.(S.R.)B14 13.15
Economy,Pa.(D.R.)B14 16.35
Economy(Staybolt)B14. 16.80
McK.Rks(S.R.) L5 ...13.15
McK.Rks.(D.R.) L5 ..18.00
McK.Rks.(Staybolt) L5 19.15

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)
Ala.City,Ala. R2 ....4.675
Allenport,Pa. P7 ....4.675
Ashland,Ky.(8) A10 ..4.675
Cleveland J5, R2 .....4.675
Conshohocken,Pa. A3..4.725
Detroit(8) M1 .....4.775
Ecorse,Mich. G5 .....4.775
Fairfield,Ala. T2 .....4.675
Fairless,Pa. U5 .....4.725
Fontana,Calif. K1 ....5.525
Gary,Ind. U5 .....4.675
Geneva,Utah C11 ....4.775
GraniteCity,Ill(8) G4..4.875
Ind.Harbor,Ind. I-2, Y1 4.675
Irvin,Pa. U5 .....4.675
Lackawanna,N.Y. B2..4.675
Munhall,Pa. U5 .....4.675
Newport,Ky.(8) A2 ..4.675
Niles,O. M21 .....4.675
Pittsburg,Calif. C11 ..5.375
Pittsburgh J5 .....4.675
Portsmouth,O. P12 ....4.675
Riverdale,Ill. A1 .....4.675
Sharon,Pa. S3 .....4.675
S.Chicago,Ill. W14 ....4.675
SparrowsPoint,Md. B2 .4.675
Steubenville,O. W10 ..4.675
Warren,O. R2 .....4.675
Weirton,W.Va. W6 ....4.675
Youngstown U5, Y1 ...4.675

SHEETS, H.R. (19 Ga. & Lighter)
Niles,O. M21 .....5.75

SHEETS, H.R. Alloy
Gary,Ind. U5 .....7.75
Ind.Harbor,Ind. Y1 ....7.75
Irvin,Pa. U5 .....7.75
Newport,Ky. A2 .....7.75
Youngstown Y1, U5 ....7.75

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy
Cleveland J5, R2 .....6.90
Conshohocken,Pa. A3 ..6.95
Ecorse,Mich. G5 .....7.00
Fairfield,Ala. T2 .....6.90
Fairless,Pa. U5 .....6.95
Fontana,Calif. K1 ....7.75
Gary,Ind. U5 .....6.90
Ind.Harbor,Ind. I-2, Y1 6.90
Irvin,Pa. U5 .....6.90
Lackawanna(35) B2 ....6.90
Munhall,Pa. U5 .....6.90
Pittsburgh J5 .....6.90
S.Chicago,Ill. U5 .....6.90
SparrowsPoint(36) B2 ..6.90
Warren,O. R2 .....6.90
Weirton,W.Va. W6 ....6.90
Youngstown U5, Y1 ....6.90

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)
Ashland,Ky.(8) A10 ..4.925
Cleveland R2 .....5.425
Ind.Harbor,Ind. I-2 ..4.925
Warren,O. R2 .....5.425

SHEETS, Cold-Rolled Steel (Commercial Quality)
Allenport,Pa. P7 .....5.75
Cleveland J5, R2 .....5.75
Conshohocken,Pa. A3 ..5.80
Detroit, M1 .....5.75
Ecorse,Mich. G5 .....5.85
Fairfield,Ala. T2 .....5.75
Fairless,Pa. U5 .....5.80
Follansbee,W.Va. F4 ..5.75
Fontana,Calif. K1 .....7.00
Gary,Ind. U5 .....5.75
GraniteCity,Ill. G4 ....5.95
Ind.Harbor,Ind. I-2, Y1 5.75
Irvin,Pa. U5 .....5.75
Lackawanna,N.Y. B2 ..5.75
Mansfield,O. E6 .....5.75
Middletown,O. A10 ....5.75
Newport,Ky. A2 .....5.75
Pittsburg,Calif. C11 ....6.70
Pittsburgh J5 .....5.75
Portsmouth,O. P12 ....5.75
SparrowsPoint,Md. B2 ..5.75
Steubenville,O. W10 ....5.75
Warren,O. R2 .....5.75
Weirton,W.Va. W6 ....5.75
Yorkville,O. W10 .....5.75
Youngstown Y1 .....5.75

SHEETS, Cold-Rolled High-Strength, Low-Alloy
Cleveland J5, R2 ....8.525
Ecorse,Mich. G5 .....8.625
Fairless,Pa. U5 .....8.575
Fontana,Calif. K1 ....9.775
Gary,Ind. U5 .....8.525
IndianaHarbor,Ind. Y1 ..8.525
Irvin,Pa. U5 .....8.525
Lackawanna(37) B2 ..8.525
Pittsburgh J5 .....8.525
SparrowsPoint(38) B2 .8.525
Warren,O. R2 .....8.525
Weirton,W.Va. W6 ....8.525
Youngstown Y1 .....8.525

SHEETS, Cold-Rolled Ingot Iron
Cleveland R2 .....6.50
Middletown,O. A10 ....6.25
Warren,O. R2 .....6.50

SHEETS, Culvert

	Cu Steel	Cu Fe
Ashland,Ky. A10	6.65	6.90
Canton,O. R2	6.65	7.15
Fairfield T2	6.65	6.90
Gary,Ind. U5	6.65	6.90
GraniteCity,Ill. G4	6.85	...
Ind.Harbor I-2	6.65	6.90
Irvin,Pa. U5	6.65	6.90
Kokomo,Ind. C16	6.75	...
MartinsFry. W10	6.65	...
Pittsburgh J5	6.65	...
Pitts.,Calif. C11	7.40	...
SparrowsPt. B2	6.65	...

SHEETS, Culvert—Pure Iron
Ind.Harbor,Ind. I-2 ....6.90
MartinsFry.,O. W10 ....6.90

SHEETS, Galvanized Steel Hot-Dipped
Ala.City,Ala. R2 .....6.30‡
Ashland,Ky. A10 ....6.30†
Canton,O. R2 .....6.30‡
Dover,O. R1 .....6.30†
Fairfield,Ala. T2 .....6.30†
Gary,Ind. U5 .....6.30†
GraniteCity,Ill. G4 ....6.50•
Ind.Harbor,Ind. I-2 ..6.30†
Irvin,Pa. U5 .....6.30†
Kokomo,Ind. C16 ....6.40‡
MartinsFerry,O. W10 ..6.30•
Middletown,O. A10 ...6.30†
Pittsburg,Calif. C11 ...7.05•
Pittsburgh J5 .....6.30†
SparrowsPt.,Md. B2 ..6.30†
Warren,O. R2 .....6.30†
Weirton,W.Va. W6 ....6.30•

•Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Well Casing
Fontana,Calif. K1 ....7.025

SHEETS, Galvanized High-Strength, Low-Alloy
Irvin,Pa. U5 .....9.275
SparrowsPoint(39) B2..9.275

SHEETS, Galvannealed Steel
Canton,O. R2 .....6.70
Irvin,Pa. U5 .....6.70

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continous)
Ashland,Ky. A10 .....6.55
Middletown,O. A10 ....6.55

SHEETS, Electrogalvanized
Cleveland (28) R2 ....7.125
Niles,O.(28) R2 .....7.125
Weirton,W.Va. W6 ....6.975

SHEETS, Aluminum Coated
Butler,Pa. A10 (type 1) 8.95
Butler,Pa. A10 (type 2) 9.05

SHEETS, Enameling Iron
Ashland,Ky. A10 ....6.325
Cleveland R2 .....6.325
Gary,Ind. U5 .....6.325
GraniteCity,Ill. G4 ....6.525
Ind.Harbor,Ind. I-2, Y1 6.325
Irvin,Pa. U5 .....6.325
Middletown,O. A10 ....6.325
Niles,O. M21 .....6.325
Youngstown Y1 .....6.325

BLUED STOCK, 29 Gage
Follansbee,W.Va. F4 ..8.35
Ind.Harbor,Ind. I-2 ...8.175
Yorkville,O. W10 ....8.175

SHEETS, Long Terne Steel (Commercial Quality)
BeechBottom,W.Va. W10 6.70
Gary,Ind. U5 .....6.70
Mansfield,O. E6 .....6.70
Middletown,O. A10 ....6.70
Niles,O. M21 .....6.70
Weirton,W.Va. W6 ....6.70

SHEETS, Long Terne, Ingot Iron
Middletown,O. A10 ....7.10

Key To Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U.S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.

B1 Babcock & Wilcox Co.
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B11 Buffalo Bolt Co., Div., Buffalo-Eclipse Corp.
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C7 Cleve. Cold Rolling Mills
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co. Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Steel Products Dept. Wickwire Spencer Steel Division
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.

D2 Detroit Steel Corp.
D3 Dearborn Division, Sharon Steel Corp.
D4 Disston Division, H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 EasternGas&FuelAssoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins, E., Steel Tube
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M13 Monarch Steel Div., Jones & Laughlin Steel Corp.
M14 McInnes Steel Co.
M16 Md. Fine&Special. Wire
M17 Metal Forming Corp.
M18 Milton Steel Division, Merritt-Chapman&Scott
M21 Mallory-Sharon Titanium Corp.
M22 Mill Strip Products Co.

N1 National Standard Co.
N2 National Supply Co.
N3 National Tube Div., U.S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N9 Newport Steel Corp.
N14 Northwest.SteelRoll.Mill
N15 Northwestern S.&W.Co.
N19 Northeastern Steel Corp.
O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co., Sub. of Barium Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Division, Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.

R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 Reliance Div.,EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Steel Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Corp.
S40 Seneca Steel Service

T2 Tenn.Coal & Iron Div., U.S. Steel Corp.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Strip Division, Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U.S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U.S. Steel Supply Div., U.S. Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Div., H. K. Porter Co. Inc.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet&Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	4.675
Allenport,Pa. P7	4.675
Alton,Ill. L1	4.875
Ashland,Ky.(8) A10	4.675
Atlanta A11	4.875
Bessemer,Ala. T2	4.675
Birmingham C15	4.675
Buffalo(27) R2	4.675
Conshohocken,Pa. A3	4.725
Detroit M1	4.775
Ecorse,Mich. G5	4.775
Fairfield,Ala. T2	4.675
Fontana,Calif. K1	5.525
Gary,Ind. U5	4.675
Houston S5	4.925
Ind.Harbor,Ind. I-2, Y1	4.675
Johnstown,Pa.(25) B2	4.675
KansasCity,Mo. S5	4.925
Lackaw'na,N.Y.(25) B2	4.675
LosAngeles(25) B3	5.425
Minnequa,Colo. C10	5.775
Pittsburg,Calif. C11	5.425
Riverdale,Ill. A1	4.675
SanFrancisco S7	5.95
Seattle(25) B3	5.675
Seattle N14	5.675
Sharon,Pa. S3	4.675
S.Chicago,Ill. W14	4.675
S.SanFrancisco(25) B3	5.425
SparrowsPoint,Md. B2	4.675
Sterling,Ill.(1) N15	4.675
Sterling,Ill. N15	4.775
Torrance,Calif. C11	5.425
Warren,O. R2	4.675
Weirton,W.Va. W6	4.675
Youngstown U5	4.675

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18	7.75
Gary,Ind. U5	7.75
Ind.Harbor,Ind. Y1	7.75
LosAngeles B3	8.95
Newport,Ky. A2	7.75
Sharon,Pa. S3	7.75
S.Chicago,Ill. W14	7.75
Youngstown U5, Y1	7.75

STRIP, Hot-Rolled High-Strength, Low-Alloy

Bessemer,Ala. T2	6.95
Conshohocken,Pa. A3	6.95
Ecorse,Mich. G5	7.05
Fairfield,Ala. T2	6.95
Gary,Ind. U5	6.95
Houston S5	7.20
Ind.Harbor,Ind. I-2, Y1	6.95
KansasCity,Mo. S5	7.20
Lackawanna,N.Y. B2	6.95
LosAngeles(25) B3	7.70
Seattle(25) B3	7.95
Sharon,Pa. S3	6.95
S.SanFrancisco(25) B3	7.70
SparrowsPoint,Md. B2	6.95
Warren,O. R2	6.95
Weirton,W.Va. W6	6.95
Youngstown U5, Y1	6.95

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	4.925
Warren,O. R2	5.425

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6	6.85
Baltimore T6	6.85
Boston T6	7.40
Buffalo S40	6.85
Cleveland A7, J5	6.85
Conshohocken,Pa. A3	6.90
Dearborn,Mich. D3	6.95
Detroit D2, M1, P20	6.95
Dover,O. G6	6.85
Ecorse,Mich. G5	6.95
Evanston,Ill. M22	6.95
Follansbee,W.Va. F4	6.85
Fontana,Calif. K1	8.70
FranklinPark,Ill. T6	6.95
Ind.Harbor,Ind. Y1	6.85
Indianapolis C8	7.00
LosAngeles C1	8.90
NewBedford,Mass. R10	7.30
NewBritain(10) S15	6.85
NewCastle,Pa. B4, E5	6.85
NewHaven,Conn. D2	7.30
NowKensington,Pa. A6	6.85
Pawtucket,R.I. R3	7.50
Pawtucket,R.I. N8	7.40
Pittsburgh J5	6.85
Riverdale,Ill. A1	6.95
Rome,N.Y.(32) R6	6.85
Sharon,Pa. S3	6.85
Trenton,N.J.(31) R5	8.30
Wallingford,Conn. W2	7.30
Warren,O. R2, T5	6.85
Weirton,W.Va. W6	6.85
Worcester,Mass. A7	7.40
Youngstown C8, Y1	6.85

STRIP, Cold-Rolled Alloy

Boston T6	14.90
Carnegie,Pa. S18	14.55
Cleveland A7	14.55
Dover,O. G6	14.55
FranklinPark,Ill. T6	14.55
Harrison,N.J. C18	14.55
Indianapolis C8	14.70
Pawtucket,R.I. N8	14.90
Sharon,Pa. S3	14.55
Worcester,Mass. A7	14.85
Youngstown C8	14.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7	10.00
Dearborn,Mich. D3	10.10
Dover,O. G6	10.10
Ecorse,Mich. G5	10.10
Ind.Harbor,Ind. Y1	10.20
Sharon,Pa. S3	10.00
Warren,O. R2	10.00
Weirton,W.Va. W6	10.00
Youngstown Y1	10.20

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	7.60

STRIP, C.R. Electrogalvanized

Cleveland A7	6.85*
Dover,O. G6	6.85*
Evanston,Ill. M22	6.95
Riverdale,Ill. A1	6.95*
Warren,O. B9, T5	6.85*
Worcester,Mass. A7	7.40*
Youngstown C8	6.85*

*Plus galvanizing extras.

STRIP, Galvanized (Continuous)

Sharon,Pa. S3	6.975

TIGHT COOPERAGE HOOP

Atlanta A11	5.40
Riverdale,Ill. A1	5.25
Sharon,Pa. S3	5.10
Youngstown U5	5.10

STRIP, Cold-Finished Spring Steel (Annealed)

	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	9.20	10.40	12.60	15.60	18.55
Boston T6	9.20	10.40	12.60	15.60	18.55
Bristol,Conn. W1	....	10.40	12.60	15.60	18.55
Carnegie,Pa. S18	8.65	10.10	12.30	15.30	....
Cleveland A7	8.65	10.10	12.30	15.30	18.25
Cleveland C7	....	10.10	12.30	15.30	18.25
Dearborn,Mich. D3	8.75	10.20	12.40	....	....
Detroit D2	8.75	10.20	12.40	15.40	....
Dover,O. G6	8.65	10.10	12.30	15.30	18.25
Evanston,Ill. M22	8.65	10.10	12.30	....	....
FranklinPark,Ill. T6	8.75	10.10	12.30	15.30	18.25
Harrison,N.J. C18	....	....	12.60	15.60	18.55
Indianapolis C8	8.80	10.25	12.30	15.30	18.25
LosAngeles C1	10.85	12.30	14.50	....	....
NewBritain,Conn.(10) S15	8.65	10.10	12.30	15.30	18.25
NewCastle,Pa. B4, E5	8.65	10.10	12.30	15.30	....
NewHaven,Conn. D2	9.10	10.40	12.60	15.60	....
NewKensington,Pa. A6	8.65	10.10	12.30	15.30	....
New York W3	....	10.40	12.60	15.60	18.55
Pawtucket,R.I. N8	9.20	10.40	12.60	15.60	18.55
Riverdale,Ill. A1	8.75	10.10	12.30	15.30	18.25
Rome,N.Y.(32) R6	8.65	10.10	12.30	15.30	18.25
Sharon,Pa. S3	8.65	10.10	12.30	15.30	18.25
Trenton,N.J. R5	....	10.40	12.60	15.60	18.55
Wallingford,Conn. W2	9.10	10.40	12.60	15.60	18.45
Warren,O. T5	8.65	10.10	12.30	15.30	18.25
Worcester,Mass. A7, T6	9.20	10.40	12.60	15.60	18.55
Youngstown C8	8.65	10.10	12.30	15.30	18.25

STRIP, Spring Steel (Tempered)

	Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	17.10	20.95	25.30
Buffalo W12	17.10	....	....
FranklinPark,Ill. T6	17.45	21.30	25.65
Harrison,N.J. C18	17.10	20.95	25.30
New York W3	17.10	20.95	25.30
Palmer,Mass. W12	17.10	....	....
Trenton,N.J. R5	17.10	20.95	25.30
Worcester,Mass. A7, T6	17.10	20.95	25.30
Youngstown C8	17.45	21.30	25.65

SILICON STEEL

H.R. SHEETS(22 Ga., cut lengths)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	....	11.00	12.05	13.05
Brackenridge,Pa. A4	....	....	11.00	12.05	13.05
Mansfield,O. E6	9.20	10.35	11.00	12.05	13.05
Newport,Ky. A2	9.20	10.35	11.00	12.05	13.05
Niles,O. M21	9.20	10.35	11.00	12.05	....
Vandergrift,Pa. U5	....	10.35	11.00	12.05	13.05
Warren,O. R2	9.20	10.35	11.00	12.05	....
Zanesville,O. A10	....	10.35	11.00	12.05	13.05
Zanesville,O. A10 (FP coils)	....	10.85	11.525	12.575	13.55
Zanesville,O. A10 (SPcoils)	....	....	11.025	12.075	13.05

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
Brackenridge,Pa. A4	....	....	11.525	12.575	13.55
GraniteCity,Ill. G4	9.40*	10.55*	11.225*	12.275*	....
IndianaHarbor,Ind. I-2	9.20†	10.35*	11.025*	12.075*	....
Mansfield,O. E6	9.70	10.85	11.525	12.575	13.55
Vandergrift,Pa. U5	9.20*	10.35*	11.025*	12.075*	13.05*
Vandergrift,Pa. U5	....	10.85†	11.525†	12.575†	13.55†
Warren,O. R2	9.20*	10.85	11.525	12.575	13.55

H.R. SHEETS (22 Ga., cut lengths)	Transformer Grades T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	14.05	14.60	15.10	16.15
Brackenridge,Pa. A4	14.05	....	....	....
Vandergrift,Pa. U5	14.05	14.60	15.10	16.15
Zanesville,O. A10	14.05	14.60	15.10	16.15

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	16.90	18.50	19.00	19.50	....
Butler,Pa. A10	....	....	18.50	19.00	19.50	....
Vandergrift,Pa. U5	15.90	16.90	18.50	19.00	19.50	14.55**
Warren,O. R2	....	....	....	....	....	14.55‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed, semiprocessed ½c lower. **Cut lengths, ¾-cent lower.

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$8.75	$9.00	$9.40
Fairfield,Ala. T2	8.85	9.10	9.50
Fairless,Pa. U5	8.85	9.10	9.50
Fontana,Calif. K1	9.50	9.75	10.15
Gary,Ind. U5	8.75	9.00	9.40
GraniteCity,Ill. G4	8.85	9.10	9.50
IndianaHarbor,Ind. I-2, Y1	8.75	9.00	9.40
Irvin,Pa. U5	8.75	9.00	9.40
Niles,O. R2	8.75	9.00	9.40
Pittsburg,Calif. C11	9.50	9.75	10.15
SparrowsPoint,Md. B2	8.85	9.10	9.50
Weirton,W.Va. W6	8.75	9.00	9.40
Yorkville,O. W10	8.75	9.00	9.40

ELECTROTIN (22-27 Gage; Dollars per 100 lb)

Aliquippa,Pa. J5	7.425	7.625	....
Niles,O. R2	7.425	7.625	7.925

TINPLATE, American	1.25 lb	1.50 lb
Aliquippa,Pa.J5	$10.05	$10.30
Fairfield,Ala.T2	10.15	10.40
Fairless,Pa. U5	10.15	10.40
Fontana,Calif.K1	10.80	11.05
Gary,Ind. U5	10.05	10.30
Irvin,Pa. U5	10.05	10.30
Pitts.,Calif. C11	10.80	11.05
Sp.Pt.,Md. B2	10.15	10.40
Weirton,W.Va.W6	10.05	10.30
Yorkville,O. W10	10.05	10.30

BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$7.85
Fairfield,Ala. T2	7.95
Fairless,Pa. U5	7.95
Fontana,Calif. K1	8.60
Gary,Ind. U5	7.85
GraniteCity,Ill. G4	7.95
Ind.Harbor,Ind. I-2, Y1	7.85
Irvin,Pa. U5	7.85
Niles,O. R2	7.85
Pittsburg,Calif. C11	8.60
SparrowsPoint,Md. B2	7.95
Weirton,W.Va. W6	7.85
Yorkville,O. W10	7.85

HOLLOWARE ENAMELING Black Plate (29 Gage)

Aliquippa,Pa. J5	$7.50
Gary,Ind. U5	7.50
GraniteCity,Ill. G4	7.60
Ind.Harbor,Ind. Y1	7.50
Irvin,Pa. U5	7.50
Yorkville,O. W10	7.50

MANUFACTURING TERNES (Special Coated; Base Box)

Gary,Ind. U5	$9.70
Irvin,Pa. U5	9.70

ROOFING SHORT TERNES (8 lb Coated; Base Box)

Gary,Ind. U5	$11.25

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	7.20
Aliquippa,Pa. J5	7.20
Alton,Ill. L1	7.40
Atlanta A11	7.40
Bartonville,Ill. K4	7.30
Buffalo W12	7.20
Chicago W13	7.20
Cleveland A7, C20	7.20
Crawfordsville,Ind. M8	7.30
Donora,Pa. A7	7.20
Duluth A7	7.20
Fairfield,Ala. T2	7.20
Fostoria,O.(24) S1	7.30
Houston S5	7.45
Jacksonville,Fla. M8	7.55
Johnstown,Pa. B2	7.20
Joliet,Ill. A7	7.20
KansasCity,Mo. S5	7.45
Kokomo,Ind. C16	7.30
LosAngeles B3	8.15
Minnequa,Colo. C10	7.45
Monessen,Pa. P7, P16	7.20
N.Tonawanda,N.Y. B11	7.20
Palmer,Mass. W12	7.50
Pittsburg,Calif. C11	8.15
Portsmouth,O. P12	7.20
Rankin,Pa. A7	7.20
S.Chicago,Ill. R2	7.20
S.SanFrancisco C10	8.15
SparrowsPoint,Md. B2	7.30
Sterling,Ill.(1) N15	7.20
Sterling,Ill. N15	7.30
Struthers,O. Y1	7.20
Waukegan,Ill. A7	7.20
Worcester,Mass. A7	7.50

WIRE, Gal'd ACSR for Cores

Bartonville,Ill. K4	11.90
Buffalo W12	11.90
Cleveland A7	11.90
Donora,Pa. A7	11.90
Duluth A7	11.90
Johnstown,Pa. B2	11.90
Minnequa,Colo. C10	12.025
Monessen,Pa. P16	11.90
Muncie,Ind. I-7	12.10
NewHaven,Conn. A7	12.20
Palmer,Mass. W12	12.20
Pittsburg,Calif. C11	12.70
Portsmouth,O. P12	11.90
Roebling,N.J. R5	12.20
SparrowsPt.,Md. B2	12.00
Struthers,O. Y1	11.90
Trenton,N.J. A7	12.20
Waukegan,Ill. A7	11.90
Worcester,Mass. A7	12.20

WIRE, Upholstery Spring

Aliquippa,Pa. J5	8.70
Alton,Ill. L1	8.90
Buffalo W12	8.70
Cleveland A7	8.70
Donora,Pa. A7	8.70
Duluth A7	8.70
Johnstown,Pa. B2	8.70
KansasCity,Mo. S5	8.95
Minnequa,Colo. C10	8.90
LosAngeles B3	9.65
Monessen,Pa. P7, P16	8.70
NewHaven,Conn. A7	9.00
Palmer,Mass. W12	9.00
Pittsburg,Calif. C11	9.65
Portsmouth,O. P12	8.70
Roebling,N.J. R5	8.70
S.Chicago,Ill. R2	8.70
S.SanFrancisco C10	9.65
SparrowsPt.,Md. B2	8.80
Struthers,O. Y1	8.70
Trenton,N.J. A7	9.00
Waukegan,Ill. A7	8.70
Worcester,Mass. A7	9.00

WIRE, MB Spring, High Carbon

Aliquippa,Pa. J5	9.025
Alton,Ill. L1	9.225
Bartonville,Ill. K4	9.125
Buffalo W12	9.025
Cleveland A7	9.025
Donora,Pa. A7	9.025
Duluth A7	9.025
Fostoria,O. S1	9.075
Johnstown,Pa. B2	9.025
LosAngeles B3	9.975
Milbury,Mass.(12) N6	9.325
Minnequa,Colo. C10	9.275
Monessen,Pa. P7, P16	9.025
Muncie,Ind. I-7	9.225
Palmer,Mass. W12	9.325
Pittsburg,Calif. C11	9.975
Portsmouth,O. P12	9.025
Roebling,N.J. R5	9.025
S.Chicago,Ill. R2	9.025
S.SanFrancisco C10	9.975
SparrowsPt.,Md. B2	9.125
Struthers,O. Y1	9.025
Trenton,N.J. A7	9.325
Waukegan,Ill. A7	9.025
Worcester J4, T6, W12	9.325
Worcester,Mass. A7	9.325

WIRE, Fine & Weaving (8" Coils)

Alton,Ill. L1	14.65
Bartonville,Ill. K4	14.25
Buffalo W12	14.45
Chicago W13	14.45
Cleveland A7	14.45
Crawfordsville,Ind. M8	14.25
Fostoria,O. S1	14.45
Jacksonville,Fla. M8	14.50
Johnstown,Pa. B2	14.45
Kokomo,Ind. C16	14.45
Monessen,Pa. P6	*14.45*
Muncie,Ind. I-7	14.65
Palmer,Mass. W12	14.75
Roebling,N.J. C10	14.45
S.SanFrancisco C10	14.80
Waukegan,Ill. A7	14.45
Worcester,Mass. A7, T6	14.75

ROPE WIRE

Bartonville,Ill. K4	12.00
Buffalo W12	12.00
Fostoria,O. S1	12.00
Johnstown,Pa. B2	12.00
Monessen,Pa. P7	*12.00*
Muncie,Ind. I-7	12.20
Palmer,Mass. W12	12.30
Portsmouth,O. P12	12.00
Roebling,N.J. R5	12.30
SparrowsPt.,Md. B2	12.10
Struthers,O. Y1	12.00
Worcester,Mass. J4	12.30

(A) Plow and Mild Plow; add 0.25c for Improved Plow

WIRE

WIRE, Tire Bead

Bartonville,Ill. K4	15.75
Monessen,Pa. P16	15.45
Roebling,N.J. R5	16.10

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	10.75
Baltimore T6	11.05
Boston T6	11.05
Buffalo W12	10.75
Chicago W13	10.85
Cleveland A7	10.75
Crawfordsville,Ind. M8	10.75
Dover,O. G6	10.75
Fostoria,O. S1	11.05
FranklinPark,Ill. T6	10.85
Kokomo,Ind. C16	10.75
Massillon,O. R8	10.75
Milwaukee C23	10.95
Monessen,Pa. P7, P16	10.75
NewKensington,Pa. A6	10.75
Palmer,Mass. W12	11.05
Pawtucket,R.I. N8	11.05
Riverdale,Ill. A1	10.85
Rome,N.Y. R6	10.75
Trenton,N.J. R5	11.05
Worcester,Mass. A7, T6	11.05

NAILS & POLISHED STAPLES,

Stock	Col.
AlabamaCity,Ala. R2	.164
Aliquippa,Pa. J5	.164
Atlanta A11	.166
Bartonville,Ill. K4	.166
Crawfordsville,Ind. M8	.166
Donora,Pa. A7	.164
Duluth A7	.164
Fairfield,Ala. T2	.164
Houston,Tex. S5	.169
Jacksonville,Fla.(20) M8	175
Johnstown,Pa. B2	.164
Joliet,Ill. A7	.164
KansasCity,Mo. S5	.169
Kokomo,Ind. C16	.166
Minnequa,Colo. C10	.169
Monessen,Pa. P7	.164
Pittsburg,Calif. C11	.183
Rankin,Pa. A7	.164
S.Chicago,Ill. R2	.164
SparrowsPt.,Md. B2	.166
Sterling,Ill. (7) N15	.166
Worcester,Mass. A7	.170

NAILS, Stock

	Col.
Chicago W13	.164
Cleveland A9	.170

(To Wholesalers; per cwt)

Galveston,Tex. D7	$8.75

NAILS, Cut (100 lb keg)
To Dealers (33)

Conshohocken,Pa. A3	$9.80
Wheeling,W.Va. W10	9.80

TIE WIRE, Automatic Baler (14½ Ga.)(Per 97 lb Net Box)

Coil No. 3150	
AlabamaCity,Ala. R2	$9.53
Atlanta A11	9.63
Bartonville,Ill. K4	9.63
Buffalo W12	9.82
Chicago W13	9.82
Crawfordsville,Ind. M8	9.63
Donora,Pa. A7	9.82
Duluth A7	9.82
Fairfield,Ala. T2	9.82
Houston S5	10.07
Jacksonville,Fla. M8	10.09
Johnstown,Pa. B2	9.82
Joliet,Ill. A7	9.82
KansasCity,Mo. S5	10.07
Kokomo,Ind. C16	9.92
LosAngeles B3	10.61
Minnequa,Colo. C10	10.07
Pittsburg,Calif. C11	10.60
S.Chicago,Ill. R2	9.53
S.SanFrancisco C10	10.60
SparrowsPt.,Md. B2	9.92
Sterling,Ill.(37) N15	9.82

Coil No. 6500 Stand.

AlabamaCity,Ala. R2	$9.85
Atlanta A11	9.95
Bartonville,Ill. K4	9.95
Buffalo W12	10.15
Chicago W13	10.15
Crawfordsville,Ind. M8	9.95
Donora,Pa. A7	10.15
Duluth A7	10.15
Fairfield,Ala. T2	10.15
Houston S5	10.40
Jacksonville,Fla. M8	10.41
Johnstown,Pa. B2	10.15
Joliet,Ill. A7	10.15
KansasCity,Mo. S5	10.40
Kokomo,Ind. C16	10.25
LosAngeles B3	10.95
Minnequa,Colo. C10	10.40
Pittsburg,Calif. C11	10.95
S.Chicago,Ill. R2	9.85
S.SanFrancisco C10	10.95
SparrowsPt.,Md. B2	10.25
Sterling,Ill.(37) N15	10.15

Coil Interim

AlabamaCity,Ala. R2	$9.90
Atlanta A11	10.00
Bartonville,Ill. K4	10.00
Buffalo W12	10.20
Chicago W13	10.20
Crawfordsville,Ind. M8	10.00
Donora,Pa. A7	10.20
Duluth A7	10.20
Fairfield,Ala. T2	10.20
Houston S5	10.45
Jacksonville,Fla. M8	10.46
Johnstown,Pa. B2	10.20
Joliet,Ill. A7	10.20
KansasCity,Mo. S5	10.45
Kokomo,Ind. C16	10.30
LosAngeles B3	11.00
Minnequa,Colo. C10	10.45
Pittsburg,Calif. C11	11.00
S.Chicago,Ill. R2	9.90
S.SanFrancisco C10	11.00
SparrowsPt.,Md. B2	10.30
Sterling,Ill. (37) N15	10.20

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	.190
Atlanta A11	.192
Bartonville,Ill. K4	.192
Crawfordsville,Ind. M8	.192
Donora,Pa. A7	.196
Duluth A7	.196
Fairfield,Ala. T2	.196
Houston S5	.201
Jacksonville,Fla. M8	.197
Joliet,Ill. A7	.190
KansasCity,Mo. S5	.201
Kokomo,Ind. C16	.198
Minnequa,Colo. C10	*.201*
Pittsburg,Calif. C11	.220
S.Chicago,Ill. R2	.190
S.SanFrancisco C10	*.220*
Sterling,Ill. (7) N15	.196
SparrowsPt.,Md. B2	.198
Tonawanda,N.Y. B12	.169
Williamsport,Pa. S19	.175

FENCE POSTS

ChicagoHts.,Ill. C2, I-2	.167
Duluth A7	.167
Franklin,Pa. F5	.167
Huntington,W.Va. W7	.169
Johnstown,Pa. B2	.167
Marion,O. P11	.167
Minnequa,Colo. C10	.172
Sterling,Ill.(1) N15	.167
Tonawanda,N.Y. B12	.169
Williamsport,Pa. S19	.175

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	.184**
Aliquippa,Pa. J5	.181§
Atlanta A11	.190*
Bartonville,Ill. K4	.190
Crawfordsville,Ind. M8	.190
Donora,Pa. A7	.184†
Duluth A7	.184†
Fairfield,Ala. T2	.184†
Houston,Tex. S5	.189**
Jacksonville,Fla. M8	.195
Johnstown,Pa. B2	.188*
Joliet,Ill. A7	.184†
KansasCity,Mo. S5	.189**
Kokomo,Ind. C16	.186†
Minnequa,Colo. C10	.189**
Monessen,Pa. P7	.188*
Pittsburg,Calif. C11	.204†
Rankin,Pa. A7	.184†
S.Chicago,Ill. R2	.184**
S.SanFrancisco C10	.204**
SparrowsPoint,Md. B2	.190*
Sterling,Ill.(7) N15	.190*

WOVEN FENCE, 9-15 Ga.

	Col.
Ala.City,Ala. R2	.176**
Allq'ppa,Pa. 9-14½ga.J5	179§
Atlanta A11	.182*
Bartonville,Ill. K4	.182
Crawfordsville,Ind. M8	.182
Donora,Pa. A7	.176†
Duluth A7	.176†
Fairfield,Ala. T2	.176†
Houston,Tex. S5	.181**
Jacksonville,Fla. M8	.187
Johnstown,Pa.(43) B2	.180*
Joliet,Ill. A7	.176†
KansasCity,Mo. S5	.181**
Kokomo,Ind. C16	.178†
Minnequa,Colo. C10	.181**
Monessen,Pa. 9 ga. P7	.180*
Pittsburg,Calif C11	.199†
Rankin,Pa. A7	.176†
S.Chicago,Ill. R2	.176**
Sterling,Ill.(7) N15	.182*

WIRE (16 gage)	An'ld Galv. Stone	Stone
Ala.City,Ala.R2	15.70	17.25**
Allq'ppa,Pa. J5	.15.70	17.50
Bartonville K4	.15.80	17.75
Buffalo W12	....16.10	....
Cleveland A7	....16.00	....
Crawf'dsville M8	15.80	17.75
Fostoria,O. S1	.16.50	18.05†
Houston S5	....16.25	17.80**
Jacksonville M8	.16.05	18.00
Johnstown B2	..16.00	17.95*
Kan.City,Mo. S5	16.25	....
Kokomo C16	..16.10	17.65†
Minnequa C10	..16.25	17.80*
P'im'r,Mass.W12	16.30	17.85†
Pitts.,Calif. C11	.16.35	17.90†
SparrowsPt. B2	16.10	18.05*
Sterling(37) N15	16.00	17.95*
Waukegan A7	..16.00	17.55†
Worcester A7	..16.30	....

WIRE, Merchant Quality

(6 to 8 gage)	An'ld Galv.
Ala.City,Ala. R2	7.95 8.35**
Aliquippa J5	....7.95 8.475§
Atlanta (48) A11	8.05 8.65*
Bartonville(48) K4	.8.05 8.65
Buffalo W12	....8.20 8.75†
Cleveland A7	....8.20 ....
Crawfordsville M8	.8.05 8.65
Donora,Pa. A7	..8.20 8.75†
Duluth A7	.....8.20 8.75†
Fairfield T2	.....8.20 8.75†
Houston(48) S5	..8.45 9.00**
Jacks'ville,Fla. M8	8.30 8.90
Johnstown B2(48)	8.20 8.95*
Joliet,Ill. A7	....8.20 8.75†
Kans.City(48) S5	8.45 9.00**
Kokomo C16	....8.30 8.85†
LosAngeles B3	..9.15 9.90*
Minnequa C10	....8.45 9.00‡
Monessen P7(48)	.7.95 8.55*
Palmer,Mass. W12	8.50 9.05†
Pitts.,Calif. C11	..9.15 9.70†
Rankin,Pa. A7	..8.20 8.75†
S.Chicago R2	..7.95 8.35**
S.SanFran. C10	..9.15 9.70*
Spar'wsPt. B2(48)	8.30 9.05*
Sterling(37)(48)	N15 8.35 9.10
Struth'rs,O.(48)	Y1 8.20 8.85‡
Worcester,Mass.A7	8.50 9.05†

Based on zinc price of: *13.50c. †5c. §10c. ‡Less than 10c. ††13c. **Subject to zinc equalization extras.

FASTENERS

(Base discounts, full container quantity, per cent off list, f.o.b. mill)

BOLTS

Carriage, Machine Bolts
Full Size Body (cut thread)

½ in. and smaller:	
6 in. and shorter	52.5
Lower than 6 in.	43.5
⅝ in. thru 1 in:	
6 in. and shorter	43.5
Longer than 6 in.	41.5
1⅛ in. and larger:	
All lengths	41.5

Undersized Body (rolled thread)

½ in. and smaller:	
6 in. and shorter	52.5

Carriage, Machine,Lag Bolts

Hot Galvanized:	
½ in. and smaller:	
6 in. and shorter	32.0
Longer than 6 in.	19.0
⅝ in. thru 1 in.:	
6 in. and shorter	16.0
Longer than 6 in.	16.0
1⅛ in. and larger:	
All lengths	16.0
Lag Bolts	
All diameters:	
6 in. and shorter	52.5
Longer than 6 in.	44.5
Plow and Tap Bolts	
½ in. and smaller by 6 in. and shorter	52.0
Larger than ½ in. or longer than 6 in.	44.5
Blank Bolts	44.5
Step, Elevator, Tire Bolts	52.0
Stove Bolts, Slotted	
⅛ to ¼-in. incl., 3 in. and shorter	54.00
9/32 to ½-in., inclusive	54.00

NUTS

Reg. & Heavy Square Nuts:	
All sizes	58.0
Square Nuts, Reg. & Heavy, Hot Galvanized:	
All sizes	44.0

Hex Nuts, Reg. & Heavy, Hot Pressed:

¾ in. and smaller	61.5
⅞ in. to 1 in., incl.	57.5
1⅛ in. to 1½ in., incl.	62.5
1⅝ in. and larger	56.0

Hex Nuts, Reg. & Heavy, Cold Punched:

¾ in. and smaller	61.5
⅞ in. to 1½ in., incl.	57.5
1⅝ in. and larger	56.0

Hex Nuts, All Types, Hot Galvanized:

¾ in. and smaller	48.0
⅞ in. to 1 in., incl.	44.0
1⅛ in. to 1½ in., incl.	49.0

Hex Nuts, Semifinished, Heavy (Incl. Slotted):

¾ in. and smaller	61.5
⅞ in. to 1½ in., incl.	57.5
1⅝ in. and larger	56.0

Hex Nuts, Finished (Incl. Slotted and Castellated):

1 in. and smaller	64.00
1⅛ in. to 1½ in., incl.	60.5
1⅝ in. and larger	56.0

Semifinished Hex Nuts, Reg. (Including Slotted):

⅝ in. and smaller	61.5
¾ in. to 1-in., incl.	64.0
1⅛ in. to 1½ in., incl.	60.5
1⅝ in. and larger	56.0

CAP AND SET SCREWS

(Base discounts, packages, per cent off list, f.o.b. mill)

Hex Head Cap Screws, Coarse or Fine Thread, Bright:

6 in. and shorter:	
⅝ in. and smaller	44.0
¾, ⅞ and 1 in. diam.	27.0
Longer than 6 in.:	
⅝ in. and smaller	14.0
¾, ⅞ and 1 in. diam.	0.5

High Carbon, Heat Treated:

6 in. and shorter:	
⅝ in. and smaller	31.0
¾, ⅞ and 1 in. diam.	9.0
Longer than 6 in.:	
⅝ in. and smaller	+6
¾, ⅞ and 1 in. diam.	+24

Flat Head Cap Screws:

¾ in. and smaller	+65.0

Set Screws, Square Head, Cup Point, Coarse Thread Through 1 in. diam.:

6 in. and shorter	11
Longer than 6 in.	+10

RIVETS

F.o.b Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.
Structural ½-in., larger 11.50
⅞-in. under List less 23%

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	24.55	23.54
1¼	13	....	29.07	23.36
1½	13	27.45	32.14	25.83
1¾	13	32.43	37.97	30.51
2	13	36.34	42.56	34.20
2¼	13	40.93	47.94	38.52
2¼	12	44.42	52.03	41.81
2½	12	48.94	57.31	46.05
2¾	12	52.99	62.05	49.88
3	12	56.51	66.18	53.19

RAILWAY MATERIALS

	Standard No. 1	Standard No. 2	Tee Rails All No. 2	Tee Rails 60 lb Under
RAILS				
Bessemer,Pa. U5	5.275	5.175	5.225	6.25
Ensley,Ala. T2	5.275	5.175	....	6.25
Fairfield,Ala. T2	....	....	....	6.25
Huntington,W.Va. C15	....	....	....	6.25
Gary,Ind. U5	5.275	5.175	5.225	....
IndianaHarbor,Ind. I-2	5.275	5.175	5.225	....
Johnstown,Pa. B2	....	....	....(16)	6.25
Lackawanna,N.Y. B2	5.275	5.175	....	6.25
Minnequa,Colo. C10	5.275	5.175	....	6.75
Steelton,Pa. B2	5.275	5.175	....	....
Williamsport,Pa. S19	....	....	....	6.15

TIE PLATES

Fairfield,Ala. T2	6.275
Gary,Ind. U5	6.275
Ind.Harbor,Ind. I-2	6.275
Lackawanna,N.Y. B2	6.275
Minnequa,Colo. C10	6.275
Seattle B3	6.425
Steelton,Pa. B2	6.275
Torrance,Calif. C11	6.425

JOINT BARS

Bessemer,Pa. U5	6.60
Fairfield,Ala. T2	6.60
Ind.Harbor,Ind. I-2	6.60
Joliet,Ill. U5	6.60
Lackawanna,N.Y. B2	6.60
Minnequa,Colo. C10	6.60
Steelton,Pa. B2	6.60

AXLES

Ind.Harbor,Ind. S13	8.35
Johnstown,Pa. B2	8.35

TRACK BOLTS, Untreated

Cleveland R2	13.85
KansasCity,Mo. S5	13.85
Lebanon,Pa. B2	13.85
Minnequa,Colo. C10	13.85
Pittsburgh P14	13.10
Seattle B3	14.35

SCREW SPIKES

Lebanon,Pa. B2	13.60
Pittsburgh P14	12.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2	9.225
Ind.Harbor,Ind. I-2, Y1	9.225
KansasCity,Mo. S5	9.225
Lebanon,Pa. B2	9.225
Minnequa,Colo. C10	9.225
Pittsburgh J5	9.225
Seattle B3	9.725
S.Chicago,Ill. R2	9.225
Struthers,O. Y1	9.225
Youngstown R2	9.225

Footnotes

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1⅛ to under 1 7/16 in.; 1 7/16 to under 1 5/16 in.; 6.23c; 1 15/16 to 8 in.; inclusive, 6.60c.
(6) Chicago or Birm. base.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass., base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.143 to 0.249 in.; for gage 0.142 and lighter, 5.80c.
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(20) Plus 1c per 100 lb.
(21) New Haven, Conn. base.
(22) Deld. San Francisco Bay area.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Delivered in mill zone, 5.685c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Youngstown base.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝-in.; 7.30c, for widths ⅝-in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) To jobbers, deduct 20c.
(34) 9.60c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 14 Ga. & lighter; 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.
(41) 9.10c for cut lengths.
(42) Mill lengths, f.o.b. mill; deld. in mill zone or within switching limits, 5.685c.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½-in. and smaller rounds; 8.65c, over 3½-in. and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+5.25	+21.75	1.25	+16.5	3.75	+14	5.25	+12.5	5.25	+12.5	5	+12.75	7.5	+10.25
Ambridge, Pa. N2	+5.25	....	1.25	....	3.75	....	5.25	....	5.25	....	5	....	7.5	....
Lorain, O. N3	+5.25	+21.75	1.25	+16.5	3.75	+14	5.25	+12.5	5.25	+12.5	5	+12.75	7.5	+10.25
Youngstown Y1	+5.25	+21.75	1.25	+16.5	3.75	+14	5.25	+12.5	5.25	+12.5	5	+12.75	7.5	+10.25

ELECTRIC WELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+5.25	+21.75	1.25	+16.5	3.75	+14	5.25	+12.5	5.25	+12.5	5	+12.75	7.5	+10.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	9.25	+8	12.25	+4	15.75	0.5	18.25	1.75
Alton, Ill. L1	....	....	....	....	....	....	7.25	+10	10.25	+6	13.75	+1.5	16.25	+0.25
Benwood, W. Va. W10	6.5	+22	+4.75	+30.25	+14.75	+39.25	9.25	+8	12.25	+4	15.75	0.5	18.25	1.75
Butler, Pa. F6	7.5	+21	+3	+28.5	+12.5	+37	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	9.25	+8	12.25	+4	15.75	0.5	18.25	1.75
Fairless, Pa. N3	....	....	....	....	....	....	7.25	+10	10.25	+6	13.75	+1.5	16.25	+0.25
Fontana, Calif. K1	....	....	....	....	....	....	3.75	+21	+0.75	+17	2.75	+12.5	5.25	+11.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	8.25	+9	11.25	+5	14.75	+0.5	17.25	+0.75
Lorain, O. N3	....	....	....	....	....	....	9.25	+8	12.25	+4	15.75	0.5	18.25	1.75
Sharon, Pa. S4	7.5	+21	+3	+28.5	+12.5	+37	....	....	....	....	....	....	....	....
Sharon,Pa. M6	....	....	....	....	....	....	9.25	+8	12.25	+4	15.75	0.5	18.25	1.75
Sparrows Pt., Md. B2	5.5	+23	+0.5	+30.5	+14.5	+39	7.25	+10	10.25	+6	13.75	+1.5	16.25	+0.25
Wheatland, Pa. W9	7.5	+21	+3	+28.5	+12.5	+37	9.25	+8	12.25	+4	15.75	0.5	18.25	1.75
Youngstown R2, Y1	....	....	....	....	....	....	9.25	+8	12.25	+4	15.75	0.5	18.25	1.75

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.73		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	18.75	2.75	19.25	3.25	20.75	3.5	20.75	3.5	....	....	....	....
Alton, Ill. L1	16.75	0.75	17.25	1.25	18.75	1.5	18.75	1.5	....	....	....	....
Benwood, W. Va. W10	18.75	2.75	19.25	3.25	20.75	3.5	20.75	3.5	10.25	+7.5	10.25	+7.5
Etna, Pa. N2	18.75	2.75	19.25	3.25	20.75	3.5	20.75	3.5	10.25	+7.5	10.25	+7.5
Fairless, Pa. N3	16.75	0.75	17.25	1.25	18.75	1.5	18.75	1.5	8.25	+9.5	8.25	+9.5
Fontana, Calif. K1	5.75	+10	6.25	+9.75	7.75	+9.5	7.75	+9.5	+2.75	+20.5	+2.75	+20.5
Indiana Harbor, Ind. Y1	17.75	1.75	18.25	2.25	19.75	2.5	19.25	2.5	9.25	+8.5	9.25	+8.5
Lorain, O. N3	18.75	2.75	19.25	3.25	20.75	3.5	20.75	3.5	....	....	....	....
Sharon, Pa. M6	18.75	2.75	19.25	3.25	20.75	3.5	20.75	3.5	....	....	....	....
Sparrows Pt., Md. B2	16.75	0.75	17.25	1.25	18.75	1.5	18.75	1.5	8.25	+9.5	8.25	+9.5
Wheatland, Pa. W9	18.75	2.75	19.25	3.25	20.75	3.5	20.75	3.5	10.25	+7.5	10.25	+7.5
Youngstown R2, Y1	18.75	2.75	19.25	3.25	20.75	3.5	20.75	3.5	10.25	+7.5	10.25	+7.5

*Galvanized pipe discounts based on current price of zinc (12.00c, East St. Louis).

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	Wire Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	21.25	26.00	....	34.50	....	40.50	42.50	46.75	43.25
202	22.75	29.00	35.00	37.50	39.25	41.25	43.25	47.25	47.25
301	22.25	27.00	35.75	35.75	40.25	42.50	44.50	49.25	45.75
302	24.25	30.25	36.50	39.00	41.00	43.25	45.50	50.00	50.00
302B	24.50	31.50	39.25	44.00	43.25	45.50	47.50	54.75	54.75
303	....	30.75	39.50	....	44.00	46.25	48.00	54.50	54.50
304	26.00	32.00	39.00	42.50	43.75	46.00	48.75	53.25	53.25
304L	....	....	46.50	49.50	51.25	53.50	56.25	60.75	60.75
305	27.50	35.25	40.75	45.75	43.75	46.00	49.25	56.50	56.50
308	29.50	36.75	45.50	48.25	50.75	53.50	58.00	60.50	60.50
309	38.25	47.50	55.50	62.00	61.25	64.50	68.25	77.50	77.50
310	47.75	59.25	75.00	81.00	83.25	87.50	89.25	93.00	93.00
314	....	....	....	....	83.25	....	90.25	....	100.50
316	38.25	47.50	59.75	66.50	66.75	70.25	73.75	78.25	78.25
316L	....	....	67.25	73.00	74.25	77.75	81.25	85.75	85.75
317	46.25	57.75	73.75	84.75	83.00	87.25	90.00	97.00	97.00
321	31.00	38.50	45.25	51.50	50.50	53.25	57.50	63.00	63.00
18-8 CbTa	35.50	44.75	53.50	61.00	59.25	62.25	67.00	76.25	76.25
403	....	....	30.75	....	34.50	36.25	38.75	46.50	46.50
405	18.75	24.50	28.50	34.50	32.50	34.00	36.00	45.00	45.00
410	16.00	20.75	27.25	29.75	31.00	32.50	33.75	38.75	38.75
416	....	....	27.75	....	31.50	33.00	34.75	46.50	46.50
420	....	32.25	33.00	40.25	37.75	39.75	43.50	59.50	59.50
430	16.25	21.00	27.75	30.75	31.50	33.00	34.50	39.25	39.25
430F	....	....	28.25	....	32.00	33.50	35.25	49.75	49.75
431	....	27.75	36.25	....	40.50	42.50	44.25	53.75	53.75
446	....	....	37.75	56.75	42.50	44.75	46.00	67.25	67.25

Stainless Steel Producers Are: Allegheny Ludlum Steel Corp.; Alloy Metal Wire Div., H. K. Porter Co. Inc.; Alloy Tube Div., Carpenter Steel Co.; American Steel & Wire Div., U.S. Steel Corp.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; G. O. Carlson Inc.; Charter Wire Products Co.; Cold Metal Products Co.; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Elwood Ivins Steel Tube Works Inc.; Firth Sterling Inc.; Ft. Wayne Metals Inc.; Globe Steel Tubes Co.; Helical Tube Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Joslyn Mfg. & Supply Co.; Kenmore Metals Corp.; Maryland Fine & Specialty Wire Co.; McInnes Steel Co.; McLouth Steel Corp.; Metal Forming Corp.; National-Standard Co.; National Tube Div., U.S. Steel Corp.; Newman-Crosby Steel Co.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Rodney Metals Inc.; Rome Mfg. Co.; Rotary Electric Steel Co.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Spencer Wire Corp.; Stainless Welded Products Inc.; Standard Tube Co.; Superior Steel Corp.; Superior Tube Co.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co.; Tube Methods Inc.; Ulbrich Stainless Steels; United States Steel Corp.; Universal-Cyclops Steel Co.; Wallingford Steel Co.; Washington Steel Corp.

Clad Steel

	Plates—Carbon Base 5%	10%	15%	20%	Sheets—Carbon Base 20%
Stainless					
302	....	....	....	....	35.50
304	33.15	36.20	40.30	44.50	37.75
304-L	35.40	38.80	43.15	47.65	....
316	38.35	41.60	45.90	50.15	55.50
316-L	43.55	47.60	52.70	57.85	....
316-Cb	43.85	48.10	53.40	58.75	....
321	34.90	37.95	42.10	46.40	44.75
347	37.05	41.25	46.45	51.70	54.25
405	27.55	29.20	33.15	37.05	....
410	27.00	28.70	32.65	36.55	....
430	27.00	28.70	32.65	36.55	....
Inconel	47.28	57.90	68.50	79.20	....
Nickel	40.00	50.30	60.65	71.05	....
Nickel, Low Carbon	40.30	50.95	61.65	72.50	....
Monel	41.70	51.90	62.15	72.40	....
Copper*	....	....	....	....	46.00

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	33.00	39.85

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7, New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Regular Carbon	0.290	Cr Hot Work	0.45-0.495
Extra Carbon	0.345	W-Cr Hot Work	0.43-0.475
Special Carbon	0.41-0.45	V-Cr Hot Work	0.460
Oil Hardening	0.450	Hi-Carbon-Cr	0.830

Grade by Analysis (%) W	Cr	V	Co	Mo		$ per lb
20.25	4.25	1.6	12.25	....		4.170
18.25	4.25	1	4.75	....		2.385
18	4	2	9	....		2.755
18	4	2	....	....		1.845
18	4	1	....	....		1.680
9	3.5	..	....	....		1.275
13.5	4	3	....	....		1.945
13.75	3.75	2	5	....		2.325
6.4	4.5	1.9	....	5		1.185
6	4	3	....	6		1.430
1.5	4	1	....	8.5		1.040

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal tax.

Birmingham District	Basic	No. 2 Foundry	Malle-able	Besse-mer
Alabama City, Ala. R2	58.50	59.00	....	....
Birmingham R2	58.50	59.00‡	....	....
Birmingham U6	....	59.00‡	63.00	....
Woodward, Ala. W15	58.50**	59.00‡	63.00	....
Cincinnati, deld.	....	66.70	....	....
Buffalo District				
Buffalo H1, R2	64.50	65.00	65.50	66.00
Tonawanda, N.Y. W12	64.50	65.00	65.50	66.00
N. Tonawanda, N.Y. T9	....	65.00	65.50	66.00
Boston, deld.	75.79	76.29	76.79	....
Rochester, N.Y., deld.	67.52	68.02	68.52	....
Syracuse, N.Y., deld.	68.62	69.12	69.62	....
Chicago District				
Chicago I-3	64.50	65.00	65.00	65.50
S. Chicago, Ill. R2	64.50	....	65.00	....
S. Chicago, Ill. Y1	64.50	65.00	65.00	....
S. Chicago, Ill. W14	64.50	....	65.00	65.50
Milwaukee, deld.	66.96	67.46	67.46	67.96
Muskegon, Mich., deld.	....	78.83	78.83	....
Cleveland District				
Cleveland R2, A7	64.50	65.00	65.00	65.50
Akron, O., deld.	67.62	68.12	68.12	68.62
Mid-Atlantic District				
Birdsboro, Pa. B10	66.50	67.00	67.50	68.00
Chester, Pa. P4	66.50	67.00	67.50	....
Swedeland, Pa. A3	66.50	67.00	67.50	68.00
New York, deld.	....	73.20	73.70	....
Newark, N.J., deld.	70.52	71.02	71.52	72.02
Philadelphia, deld.	68.38	68.88	69.38	69.88
Troy, N.Y. R2	66.50	67.00	67.50	68.00
Pittsburgh District				
Neville Island, Pa. P6	64.50	65.00	65.00	65.50
Pittsburgh (N&S sides), Aliquippa, deld.	....	66.45	66.45	66.98
McKees Rocks, Pa., deld.	....	66.10	66.10	66.63
Lawrenceville, Homestead, Wilmerding, Monaca, Pa., deld.	....	66.76	66.76	67.29
Verona, Trafford, Pa., deld.	66.79	67.32	67.32	67.85
Brackenridge, Pa., deld.	67.10	67.60	67.60	68.13
Midland, Pa. C18	64.50	....	....	....

Youngstown District	Basic	No. 2 Foundry	Malle-able	Besse-mer
Hubbard, O. Y1	....	....	65.00	....
Sharpsville, Pa. S6	64.50	....	65.00	65.50
Youngstown Y1	....	....	65.00	65.50
Mansfield, O., deld.	69.40	....	69.90	70.40
Duluth I-3	64.50	65.00	65.00	65.50
Erie, Pa. I-3	64.50	65.00	65.00	65.50
Everett, Mass. E1	66.00	66.50	67.00	....
Fontana, Calif. K1	72.50	73.00	....	....
Geneva, Utah C11	64.50	65.00	....	....
Granite City, Ill. G4	66.40	66.90	67.40	....
Ironton, Utah C11	64.50	65.00	....	....
Minnequa, Colo. C10	66.50	67.00	67.50	....
Rockwood, Tenn. T3	....	59.00‡	63.00	....
Toledo, O. I-3	64.50	65.00	65.00	65.50
Cincinnati, deld.	71.04	71.54	....	....

**Phos. 0.70-0.90%; Phos. 0.30-0.60%, $59.50.
‡Phos. 0.70-0.90%; Phos. 0.30-0.50%, $60.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.
Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.
Nickel: Under 0.50% no extra; 0.50-0.74%, inclusive, add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1 for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

Jackson, O. I-3, J1	77.25
Buffalo H1	78.50

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

Calvert City, Ky. P15	$105.50
Niagara Falls, N.Y. P15	105.50
Keokuk, Iowa Open-hearth & Fdry, $9 freight allowed K2	103.50
Keokuk, Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, max frgt allowed up to $9, K2	106.50

LOW PHOSPHORUS PIG IRON, Gross Ton

Lyles, Tenn. T3 (Phos. 0.035% max)	$78.50
Rockwood, Tenn. T3 (Phos. 0.035% max)	78.50
Troy, N.Y. R2 (Phos. 0.035% max)	72.50
Philadelphia, deld.	80.26
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	69.50
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	69.50
Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	69.50
Neville Island, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	69.50

Warehouse Steel Products

Representative prices, per pound, subject to extras, f.o.b. warehouse. City delivery charges are 15 cents per 100 lb except: Moline, Norfolk, Richmond, Washington, 20 cents; Baltimore, Boston, Los Angeles, New York, Philadelphia, Portland, Spokane, San Francisco, 10 cents; Atlanta, Houston, Seattle no charge.

	SHEETS				STRIP	BARS			Standard Structural Shapes	PLATES	
	Hot-Rolled	Cold-Rolled	Gal. 10 Ga.†	Stainless Type 302	Hot-Rolled*	H.R. Rounds	C.F. Rds.‡	H.R. Alloy 4140††*		Carbon	Floor
Atlanta	8.17§	9.37§	9.83§	....	8.21	8.45	10.23	....	8.59	8.55	10.51
Baltimore	7.88	8.98	9.31	....	8.36	8.53	9.13[3]	14.68	8.75	8.26	9.76
Birmingham	7.80	9.00	9.52	....	7.82	8.07	10.12	....	8.20	8.16	10.31
Boston	8.84	9.88	11.06	60.42	8.89	9.07	....	14.69	9.10	9.18	10.68
Buffalo	7.85	9.00	10.75	....	8.05	8.25	8.70	14.50	8.50	8.50	10.05
Chattanooga	7.99	9.24	9.10	....	8.00	8.24	10.04	....	8.44	8.40	10.26
Chicago	7.78	9.00	9.70	53.25	7.82	8.07	8.35	14.15	8.20	8.16	9.49
Cincinnati	7.94	9.05	9.75	50.00	8.14	8.38	8.84	14.46	8.74	8.52	9.78
Cleveland	7.78	8.98	9.60	53.43	7.92	8.16	8.60	14.24	8.57	8.39	9.72
Denver	9.70	11.30	12.49	....	9.80	9.95	10.65	18.89	9.80	9.70	11.40
Detroit	8.03	9.25	10.05	59.50	8.17	8.37	8.70	14.41	8.74	8.51	9.74
Erie, Pa.	7.85	9.00	9.60[10]	....	7.95	8.20	8.70[10]	....	8.50	8.35	9.75
Houston	8.80	9.75	10.99	....	8.85	9.15	9.15	15.00	8.90	8.80	10.30
Jackson, Miss.	8.09	9.34	9.79	....	8.16	8.41	10.23	....	8.54	8.50	10.34
Los Angeles	9.10	12.30	11.25	57.45	9.15	9.20	12.10	15.50	9.15	9.65	11.80
Milwaukee	7.93	9.13	9.83	....	7.95	8.20	8.58	14.28	8.41	8.29	9.62
Moline, Ill.	8.13	9.35	10.05	....	8.17	8.42	8.70	....	8.55	8.51	...
New York	8.45	9.66	10.23	60.20	8.90	9.01	....	14.59	8.91	9.01	10.31
Norfolk, Va.	8.05	...	....	....	8.55	8.60	10.80	....	8.95	8.45	9.95
Philadelphia	8.15	9.07	10.29	50.69	8.82	8.71	9.31	14.51	8.70	8.68	9.70
Pittsburgh	7.78	8.99	10.05	50.00	7.92	8.07	8.60	14.15	8.20	8.16	9.49
Portland, Oreg.	9.20	11.20	11.60	55.20	11.05‡‡	9.35	13.80	14.60	9.35	9.00	12.20
Richmond, Va.	8.00	...	10.14	....	8.55	8.40	10.00	....	8.95	8.40	9.90
St. Louis	8.14	9.34	10.06	73.36	8.19	8.43	8.96	14.51	8.67	8.52	9.86
St. Paul	8.39	9.59	10.31	....	8.43	8.68	9.21	....	8.94	8.90	10.10
San Francisco	9.05	10.95	10.90	53.45	9.05	9.15	12.40	15.60	9.15	9.30	11.55
Seattle	9.55	10.70	11.65	55.20	9.55	9.50	13.40	15.85	9.35	9.30	11.70
Spokane, Wash.	9.55	10.70	11.65	....	9.55	9.50	13.40	16.60	9.35	9.30	11.70
Washington	8.48	9.58	....	....	9.06	9.13	9.73	....	9.35	8.86	10.36

*Prices do not include gage extras; †prices include gage and coating extras (based on 12.50c zinc at Los Angeles and 13.50c at other points), except in Birmingham (coating extra excluded); ‡includes 35-cent bar quality extras; §42 in. and under; **⅜-in. and heavier; ††as annealed; ‡‡over 4 in.; §§over 3 in.

Base quantities, 2000 to 4999 lb except as noted; cold-rolled strip and cold-finished bars, 2000 lb and over except in Seattle, 2000 to 9999 lb, and in Los Angeles, 6000 lb and over; stainless sheets, 8000 lb except in Chicago, New York and Boston, 10,000 lb and in San Francisco, 2000 to 4999 lb; hot-rolled products on West Coast, 2000 to 9999 lb; [3]—400 to 999 lb; [8]—1000 to 1999 lb; [8]—2000 to 3999 lb; [10]—2000 lb and over.

Refractories

Fire Clay Brick (per 1000)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beach Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parral, Portsmouth, O., Ottawa, Ill., Stevens Pottery, Ga., $135; Salina, Pa., $140; Niles, O., $138; Cutler, Utah, $165.

Super-Duty: Ironton, O., Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Pa., New Savage, Md., St. Louis, $175; Stevens Pottery, Ga., $185; Cutler, Utah, $233.

Silica Brick (per 1000)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, O., Hawstone, Pa., $150; Warren, Niles, Windham, O., Hays, Latrobe, Morrisville, Pa., $155; E. Chicago, Ind., Joliet, Rockdale, Ill., $160; Lehigh, Utah, $175; Los Angeles, $180.

Super-Duty: Hays, Sproul, Hawstone, Pa., Niles, Warren, Windham, O., Leslie, Md., Athens, Tex., $157; Morrisville, Latrobe, Pa., $160; E. Chicago, Ind., $167; Curtner, Calif., $182.

Semisilica Brick (per 1000)

Clearfield, Pa., $145; Woodbridge, N. J., $135; Philadelphia, $130.

Ladle Brick (per 1000)

Dry Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Vanport, Pa., Mexico, Vandalia, Mo., Wellsville, Irondale, New Salisbury, O., $100; Clearfield, Pa., Portsmouth, O., $102.

High-Alumina Brick (per 1000)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $235; Danville, Ill., $238; Philadelphia, Clearfield, Pa., $230; Orviston, Pa., $245.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $295; Danville, Ill., $298; Philadelphia, Clearfield, Orviston, Pa., $305.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $335; Danville, Ill., $338; Philadelphia, Clearfield, Orviston, Pa., $345.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., St. Louis, $188.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned, bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, O., Gibsonburg, Narlo, O., $16; Thornton, McCook, Ill., $16.35; Dolly Siding, Bonne Terre, Mo., $15.

Magnesite (per net ton)

Domestic, dead-burned, bulk ½-in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅜-in. grains with fines: Baltimore, $72.40.

Fluorspar

Metallurgical grades, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net tons, f.o.b. cars point of entry, duty paid, metallurgical grade: European, $34-$35; Mexican, all-rail, duty paid, $27-$27.75; barge, Brownsville, Tex., $27.75-$29.

Metal Powder

(Per pound f.o.b. shipping point in ton lots for minus 100 mesh, except as noted)

	Cents
Sponge Iron, Swedish: Deld. east of Mississippi river, ocean bags 23,000 lb and over. F.o.b. Riverton or Camden, N.J., west of Mississippi river	10.50 / 9.50
Sponge Iron, domestic, 98 + % Fe: Deld. east of Mississippi river, 23,000 lb and over. F.o.b. Riverton, N.J., west of Mississippi river	10.50 / 9.50
Sponge Iron, Canadian: F.o.b. shipping point	9.50
Electrolytic Iron: Melting stock, 99.9% Fe, irregular fragments of ⅛ in. x 1.3 in.	26.00
Annealed, 99.5% Fe	36.50
Unannealed (99+ % Fe)	34.00
Unannealed (99+ % Fe) (minus 325 mesh)	59.00
Powder Flakes (minus 16, plus 100 mesh)	29.00
Carbonyl Iron: 98.1-99.9%, 3 to 20 microns, depending on grade, 99.00-290.00, in standard 200-lb containers; all minus 200 mesh.	
Aluminum: Atomized, 500 lb drum, frght allowed	
Carlots	38.20
Ton lots	40.20
Antimony, 500 lb lots	32.00*
Brass, 5000-lb lots	34.80-43.20†
Bronze, 5000-lb lots	52.80-57.20†
Copper: Electrolytic	14.25*
Reduced	14.25*
Lead	7.50*
Manganese: Minus 35 mesh	64.00
Minus 100 mesh	70.00
Minus 200 mesh	75.00
Nickel, unannealed	$1.065
Nickel-Silver, 5000-lb lots	53.30-57.60†
Phosphor-Copper, 5000-lb lots	62.00
Copper (atomized) 5000-lb lots	44.50-52.00‡
Silicon	47.50
Solder	7.00*
Stainless Steel, 304	$1.08
Stainless Steel, 316	$1.44
Tin	14.50*
Zinc, 5000-lb lots	19.75-33.00‡
Tungsten: Melting grade, 99%	Dollars
60 to 2000 mesh: 1000 lb and over	4.00
Less than 1000 lb	4.15
Chromium, electrolytic 99.8% Cr min metallic basis	5.00

*Plus cost of metal. †Depending on composition. ‡Depending on mesh. §70% Cu, 20% Zn, 10% Ni. **64% Cu, 18% Zn, 18% Ni.

Electrodes

Threaded with nipple; unboxed, f.o.b. plant

GRAPHITE

——Inches—— Diam.	Length	Per 100 lb
2	24	$57.75
2½	30	37.25
3	40	35.25
4	40	33.25
5½	40	33.00
6	60	30.00
7	60	26.75
8, 9, 10	60	26.50
12	72	25.50
14	60	25.50
16	72	24.50
17	60	25.50
18	72	24.50
20	72	24.00
24	84	24.75

CARBON

8	60	13.30
10	60	13.00
12	60	12.95
14	60	12.85
14	72	11.95
17	60	11.85
17	72	11.40
20	84	11.40
20	90	11.00
24	72, 84	11.25
24	96	10.95
30	84	11.05
40, 35	110	10.70
40	100	10.70

Imported Steel

(Base per 100 lb, landed, duty paid, based on current ocean rates. Any increase in these rates is for buyer's account. Source of shipment: Western continental European countries)

	North Atlantic	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$7.15	$7.15	$7.15	$7.40
Bar Size Angles	6.95	6.95	6.95	7.05
Structural Angles	7.10	7.10	7.10	7.30
I-Beams	7.50	7.50	7.50	7.75
Channels	7.55	7.55	7.55	7.80
Plates (basic bessemer)	9.00	9.00	9.00	9.30
Sheets, H.R.	8.55	8.55	8.55	8.85
Sheets, C.R. (drawing quality)	8.95	8.95	8.95	9.35
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	27.17	27.17	27.17	27.64
Barbed Wire (†)	6.80	6.80	6.80	7.25
Merchant Bars	6.95	6.95	6.95	7.30
Hot-Rolled Bands	7.15	7.15	7.15	7.55
Wire Rods, Thomas Commercial No. 5	6.38	6.38	6.38	6.78
Wire Rods, O-H Cold Heading Quality No. 5	6.72	6.72	6.72	7.12
Bright Common Wire Nails (§)	8.40	8.40	8.40	8.57

†Per 82-lb, net, reel. §Per 100-lb kegs, 20d nails and heavier.

Ores

Lake Superior Iron Ore

(Prices effective for the 1957 shipping season, gross tons, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Mesabi nonbessemer	11.45
Old range bessemer	11.85
Old range nonbessemer	11.70
Open-hearth lump	12.70
High phos.	11.45

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 30, 1957, and increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

New Jersey, foundry and basic 62-64% concentrates	25.00-27.00

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 65%	27.00-27.50
N. African hematite (spot)	nom.
Brazilian iron ore, 68-69%	35.00-36.00

Tungsten Ore

Net ton unit, before duty

Foreign, wolframite, good commercial quality	$23.00-24.00
Domestic, concentrates, mine	55.00

Manganese Ore

Mn 46-48%, Indian (export tax included), $1.60-1.70 per long ton unit, c.i.f. U.S. ports, duty for buyer's account; other than Indian, $1.45-1.50; contracts by negotiation.

Chrome Ore

Gross ton f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$54.00-57.00
48% 2.8:1	51.00-54.00
48% no ratio	43.00-45.00

South African Transvaal

48% no ratio	$37.50-39.00
44% no ratio	26.00-27.00

Turkish

48% 3:1	$60.00-63.00

Domestic

Rail nearest seller

18% 3:1	$39.00

Molybdenum

Sulphide concentrate, per lb of Mo content, mines, unpacked $1.18

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60%	$3.10-3.60
60-65%	3.60-3.80

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, furnace	$14.75-15.75
Connellsville, foundry	17.50-18.50

Oven Foundry Coke

Birmingham, ovens	$23.85
Cincinnati, deld.	33.78
Buffalo, ovens	30.50
Camden, N. J., ovens	29.50
Detroit, ovens	30.50
Pontiac, deld.	32.25
Saginaw, deld.	33.83
Erie, Pa., ovens	30.50
Everett, Mass., ovens New England, deld.	31.55*
Indianapolis, ovens	29.75
Ironton, O., ovens	29.00
Cincinnati, deld.	29.27
Kearny, N. J., ovens	29.75
Milwaukee, ovens	30.50
Painesville, O., ovens	30.50
Cleveland, deld.	32.69
Philadelphia, ovens	29.50
St. Louis, ovens	31.50
Neville Island (Pittsburgh), Pa., ovens	29.25
St. Paul, ovens	29.75
Chicago, deld.	33.14
Swedeland, Pa., ovens	29.50
Terre Haute, Ind., ovens	29.75

*Or within $4.80 freight zone from works.

Coal Chemicals

Spot, cents per gallon, ovens

Pure benzene	36.00
Toluene, one deg.	32.00-34.00
Industrial xylene	32.00-35.00

Per ton, bulk, ovens

Ammonium sulfate	$32.00

Cents per pound, producing point

Phenol: Grade 1, 15.00; Grade 2-3, 14.50; Grade 4, 16.50; Grade 5, 15.25.

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, per gross ton, Palmerton, Pa. 21-23% Mn, $105; 19-21% Mn, 1-3% Si, $102.50; 16-19% Mn, $100.50.

Standard Ferromanganese: (Mn 74-76%, C 7% approx). Base price per net ton; $255, Johnstown, Duquesne, Sheridan, Pa., Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74% respectively.

(Mn 79-81%). Lump $263 per net ton, f.o.b. Anaconda or Great Falls, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

Low-Grade Ferromanganese, Regular Grade: (Mn 85-90%). Carload, lump, bulk, max. 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 1.5c for max 0.15% C grade from above prices, 3c for max 0.03% C, 3.5c for max 0.50% C, and 6.5c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 25.5c per lb of contained Mn, packed, carload 26.8c, ton lot 28.4c, less ton 29.6c. Delivered. Spot, add 0.25c.

Manganese Metal: 2" x D (Mn 95.5% min, Fe 2% max, Si 1% max, C 0.2% max). Carload, lump, bulk 45c per lb of metal; packed, 45.75c; ton lot 47.25c; less ton lot 49.25c. Delivered. Spot, add 2c.

Electrolytic Manganese Metal: Min carload, 34c; 2000 lb to min carload, 36c; 500 lb to 1999 lb, 38c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal, 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk 1.50% C grade, 18-20% Si, 12.8c per lb of alloy. Packed, c.l. 14c, ton 14.45c, less ton 15.45c, f.o.b. Alloy, W. Va., Ashtabula, O., Marietta, O., Sheffield, Ala., Portland, Oreg. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. For 3% C grade Si 12-14.5%, deduct 0.4c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $200 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium Medium-Carbon: (Ti 17-21%, C 2-4.5%). Contract $225 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l. lump, bulk, 27.75c per lb of contained Cr; c.l. packed 29.3c, ton lot 31.05c; less ton 32.45c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-71%). Contract carload, lump, bulk, C 0.025% max (Simplex) 34.75c per lb contained Cr, 0.02% max 41.5c, 0.03% max 41c, 0.06% max 39.5c, 0.1% max 39c, 0.15% max 38.75c, 0.2% max 38.5c, 0.5% max 38.25c, 1.0% max 37.5c, 1.5% max 37.35c, 2.0% max 37.25c. Ton lot, add 3.4c, less ton add 5.1c. Carload packed add 1.75c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). Contract, c.l., 2 in. x D, bulk 29.05c per lb contained Cr. Packed, c.l. 30.65c, ton 32.45c, less ton 33.95c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). Contract, carload, packed, 8M x D, 20.85c, per lb of alloy, ton lot 22.10c; less ton lots 23.3c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome-Silicon: (Cr 39-41%, Si 42-49%, C 0.05% max). Contract, carload, lump, 4" x down and 2" x down, bulk, 41.35c per lb of contained Cr; 1" x down, bulk 42.35c. Delivered.

Chromium Metal, Electrolytic: Commercial grade (Cr 99.8% min, metallic basis, Fe 0.2% max). Contract, carlot, packed 2" x D plate (about ⅛" thick) $1.29 per lb, ton lot $1.31, less ton lot $1.33. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open-hearth Grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55%, or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1 $1.05 per lb; No. 6, 68c; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

25-30% Ferrosilicon: Contract, carload, lump, bulk, 20.0c per lb of contained Si. Packed 21.40c; ton lot 22.50c, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 13c per lb of contained Si. Packed c.l. 15.5c, ton lot 16.95c, less ton 18.6c, f.o.b. Alloy, W. Va., Ashtabula, Marietta, O., Sheffield, Ala., and Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Contract, carload, lump, bulk, 15.25c per lb contained silicon. Packed, c.l. 17.25c, ton lot, 19.05c; less ton 20.4c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Contract, carload, lump, bulk, 16.4c per lb of contained Si. Packed, c.l. 18.30c, ton lot 19.95c, less ton 21.2c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Contract, carload, lump, bulk, 19.5c per lb of contained Si. Packed, c.l. 21.15c, ton lot 22.55c, less ton 23.6c. Delivered. Spot add 0.25c.

Silicon Metal: (98% min Si, 0.75% max Fe, 0.07% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Deduct 0.5c for max 1% Fe grade analyzing min 99.75% Si; 0.75c for max 1.25% Fe grades analyzing min 96.75% Si. Spot, add 0.25c.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 10.65c per lb of alloy, ton lot, packed, 11.8c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l. lump, bulk 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Contract, carload, lump, packed 27.25c per lb of alloy, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices, 100 lb and over, are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Bortam: (B 1.5%-1.9%). Ton lot, 45c per lb; less than ton lot, 50c per lb.

Carbortam: (B 1 to 2%). Contract, lump, carload 9.50 per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Contract, carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Contract, carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx 3⅛ lb each and containing 2 lb of Cr). Contract, carload, bulk, 19c per lb of briquet, carload packed in box pallets 19.2c, in bags 20.1c; 3000 lb to c.l. in box pallets 20.4c; 2000 lb to c.l. in bags, 21.3c; less than 2000 lb in bags 22.2c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Contract, carload, bulk 14.8c per lb of briquet; c.l., packed, pallets 15c, bags 16c; 3000 lb to c.l., pallets 16.2c; 2000 lb to c.l. bags, 17.2c; less ton 18.1c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). Contract, c.l. bulk 15.1c per lb of briquet; c.l. packed, pallets, 15.3c; bags 16.3c, 3000 lb to c.l., pallets, 16.5c; 2000 lb to c.l., bags 17.5c; less ton 18.4c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si). Contract, carload, bulk, 7.7c per lb of briquet; packed, pallets, 7.9c; bags 8.9c; 3000 lb to c.l., pallets 9.5c; 2000 lb to c.l. bags 10.5c; less ton 11.4c. Delivered. Spot, add 0.25c. (Small size—weighing approx 2½ lb and containing 1 lb of Si). Carload, bulk 7.85c. Packed, pallets 8.05c; bags 9.05c; 3000 lb to c.l. pallets 9.65c; 2000 lb to c.l. bags 10.65c; less ton 11.55c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.41 per pound of Mo contained, f.o.b. Langeloth, Pa.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). 5000 lb W or more $2.95 per lb of contained W; 2000 lb W to 5000 lb W, $3.05; less than 2000 lb W, $3.17. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 8% max, C 0.4% max). Contract, ton lot, 2" x D, $5.10 per lb of contained Cb. Delivered. Spot, add 10c.

Ferrotantalum—Columbium: (Cb 40% approx, Ta 20% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lot 2" x D, $4.25 per lb of contained Cb plus Ta, delivered; less ton lot $5.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Contract, c.l. packed ¼-in. x 12 M 19c per lb of alloy, ton lot 20.15c, less ton 21.4c. Delivered. Spot, add 0.25c.

Graphidox No. 5: (Si 48-52%, Ca 5.7%, Ti 9-11%). C.l. packed, 19c per lb of alloy, ton lot 20.15c; less ton lot 21.4c, f.o.b. Niagara Falls, N. Y.; Freight allowed to St. Louis.

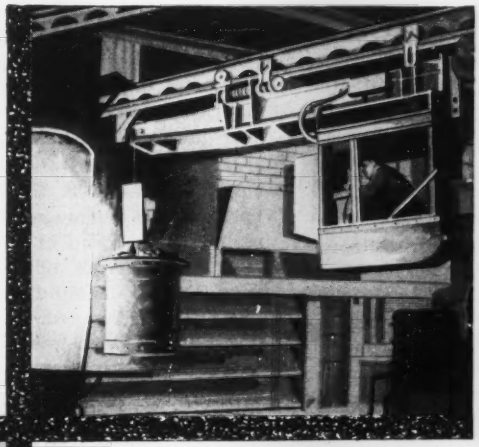
V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.1c per lb of alloy; ton lot 19.55c; less ton lot 20.8c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Simanal: (Approx 20% each Si, Mn, Al; bal. Fe). Lump, carload, bulk 18.50c. Packed c.l. 19.50c, 2000 lb to c.l. 20.50c, less than 2000 lb 21c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $4 for each 1% of P above or below the base); carload, f.o.b. sellers' works. Mt. Pleasant, Siglo, Tenn., $90 per gross ton.

Ferromolybdenum: (55-75%). Per lb contained Mo, in 200-lb container, f.o.b. Langeloth and Washington, Pa., $1.68 in all sizes except powdered which is $1.74.

Technical Molybdic-Oxide: Per lb contained Mo, in cans, $1.39; in bags, $1.38, f.o.b. Langeloth and Washington, Pa.



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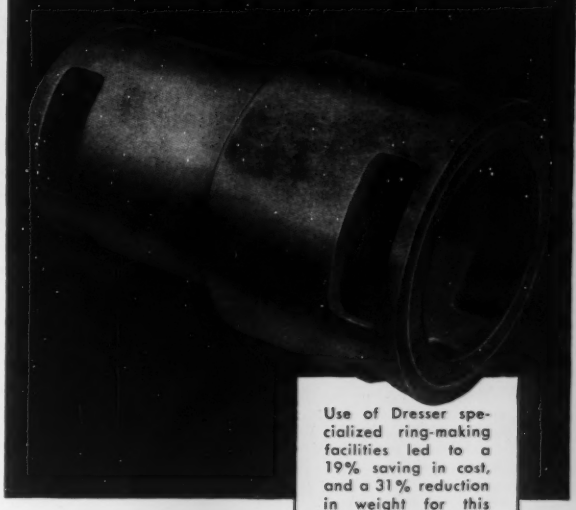

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Embargo Placed on Scrap Exports

Commerce department again shuts off export of heavy melting grades of steel scrap to Japan. Complete stoppage is expected to be temporary, pending a compromise ruling

Scrap Prices, Page 212

OFF AGAIN-ON AGAIN go Commerce department rulings on the export of No. 1 and No. 2 heavy melting scrap to Japan, the United Kingdom and the European Coal & Steel Community (see STEEL, Apr. 1, p. 153).

Ruling—While negotiations with the three foreign interests continue, Commerce officials have ruled that licenses for export in 1957 will not be issued in excess of the tonnages shipped in 1956.

That means that Japan is shut off. During last week, exports hit the 1956 level. The UK and ECSC are importing scrap from the U.S. at their 1956 rate and will not be affected by this interim ruling.

No doubt the UK and ECSC would like to increase their take above the 1956 level, but they have held back to avoid the situation in which Japan now finds herself.

Effect—Pending applications for export of scrap to Japan are being returned by the Commerce department without action. Officials point out they are not being rejected. Presumably, some compromise will be reached soon which will allow that country to take more scrap, though on a drastically reduced basis.

Philadelphia—Prices quoted on the major open-hearth grades of scrap have been increased further. No. 1 heavy melting, No. 1 bundles and No. 1 busheling have advanced to $49, delivered; No. 2 heavy melting, $41. The increase in No. 2 bundles to $39 is based primarily on a sale to the Fairless Works, whose previous purchase of No. 2 bundles a few weeks ago was on the basis of $36, delivered.

Contributing to the increasing strength of domestic scrap prices is greater demand for export. One boat is being loaded here and scrap is being collected for loading on two additional ships at this port later in the month.

New York—Brokers have advanced prices $1 a ton on mixed borings and turnings to $27-$28 and on short shovel turnings to $28-$29. Prices on other tonnage items, including cast iron scrap are unchanged.

Prices on nickel-bearing stainless steel scrap continue to decline.

Boston — No. 1 heavy melting steel is quoted at $35.50, shipping point, for movement to district consumers. This represents a drop of $16 a ton since January. Other grades are comparatively lower. Buying is light. Shipment of scrap against eastern Pennsylvania orders lags.

Detroit—The scrap market has firmed here. Indications are prices may go up another $1 or $2, then drop back. Several brokers figure this seesaw pattern will continue through the summer.

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Chicago—The scrap market here is viewed with mixed feelings. Recent price increases in eastern areas, coupled with some scattered sales of small tonnages at Chicago, have tended to strengthen the market. Some grades of scrap are quoted $1 or $2 a ton higher. Mill buying is still light so no general increases have been posted.

No. 1 factory bundles remain at $44-$45, but a sale or two at $46.50 has been made. In railroad scrap, rails of 2 ft and under went at $59-$90.

In stainless scrap, prices are still sliding. Purchases of 18-8 bundles, solids and turnings are being made at $10 to $15 a ton under recent levels.

Pittsburgh—A purchase by one of the leading mills resulted in price increases in scrap grades of $1 to $3 last week. The mill paid $45 for No. 1 heavy melting scrap, $42 for No. 2 heavy melting and $40 for No. 2 bundles. The market is steadier than it has been for many weeks, in spite of declining steel operating rates. There's a shortage of good scrap at present prices. Purchasing agents are reportedly willing to pay more to get good quality scrap.

The only weakness in the market last week was in stainless grades. Sales of 18-8 bundles and solids were made below $300 per ton.

Cincinnati—The market remains stabilized with No. 1 heavy melting quoted at $37-$38, brokers' buying price. Brokers feel that the bottom of the market was reached two weeks ago and that a moderately strong upturn is ahead. Mill buying programs have been on the modest side, the area having gone through a period of low production. Despite this, no "panic" selling by scrap suppliers was noted.

Buffalo — Open-hearth scrap prices declined $1 a ton here last week on mill purchases for May shipment.

The reduction came as a surprise. Most sellers had been anticipating an advance. But the principal consumer is taking in less material and is reportedly holding comfortable inventories.

Birmingham—Scrap buying continues limited, and prices are holding steady on most items. The cast iron market is unchanged because of increased supplies of pig iron and a slow pickup in pipe requirements. The electric furnace grades are active at unchanged prices.

St. Louis—The long-declining scrap market in this district has signaled an upturn with an increase in buying prices by two major mills. Granite City Steel Co. posted $38 to dealers for No. 2 melting and $33 for No. 2 bundles. Laclede Steel Co. has said it also will boost prices, amounts to be determined later. Both mills let it be known their purchases at the new prices will be small and for 10-day to two-week delivery instead of the usual one month.

Earlier, there had been a firm undertone to the market with railroad grades moving up slightly.

Contributing factors to the rise were the dwindling trickle of scrap from rural and industrial sources; weather ill-suited to collecting, shipping or preparing scrap; and stepped-up demand in this district for export scrap.

Los Angeles—Prices of steelmaking scrap continue to decline, dropping an average of $2. The softness in prices is attributed to uncertainty in orders from usually large consumers and to pressure from consumers to bring prices more in line with the national average. In view of the price situation, collections have dropped considerably.

Seattle—Further price adjustments have followed the recent drop in heavy melting steel. The market now appears stabilized at the lower level.

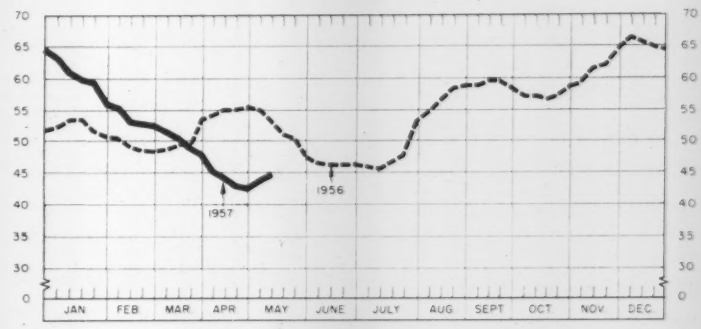
Rates from North Pacific ports to Japan have declined from $230,000, free load and discharge, to $165,000. From North Atlantic and Gulf to Japan they have dropped from $345,00 to about $270,000. Cargoes have been closed from Hawaii to Japan at $165,000; from Adak, Alaska, to Japan at $175,000, and from Puerto Rico to Japan at $215,000.

Blast furnace scrap from Montreal to Kobe, Japan, has been booked at $21.50 a gross ton and from New Orleans to Japan at $13.50. Steel scrap from North Atlantic to the West Coast for Italy was booked at $160,000, full cargo of 10,000 tons.

San Francisco—The price on No. 1 cupola cast scrap last week dropped $2 a ton. It now is considered more in line with the reduced prices on steel grades.

STEELMAKING SCRAP PRICE COMPOSITE

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania—Compiled by STEEL



May 8 1957	Week Ago	Month Ago	Year Ago	April Avg.
$44.33	$43.67	$44.00	$53.00	$43.57

Pig Iron . . .

Pig Iron Prices, Page 206

Reflecting the lag in foundry operations and the easing in cast scrap prices, the movement in merchant iron is slow.

Few foundries are operating at more than 75 per cent of normal capacity and some are operating at substantially lower levels. They are buying on a hand-to-mouth basis and appear intent on keeping inventories as low as possible. Demand from the pipe shops and manufacturers of sanitary ware is off sharply. Sellers anticipate

(*Please turn to page* 217)

Iron and Steel Scrap

Consumer prices, per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL, May 8, 1957. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

May 8	$44.33
May 1	43.67
Apr. Avg.	43.57
May 1956	50.34
May 1952	43.00

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	*44.00-45.00*
No. 2 heavy melting	*41.00-42.00*
No. 1 factory bundles	*49.00-50.00*
No. 1 dealer bundles	*44.00-45.00*
No. 2 bundles	*39.00-40.00*
No. 1 busheling	*44.00-45.00*
Machine shop turnings	*31.00-32.00*
Mixed borings, turnings	*31.00-32.00*
Short shovel turnings	*35.00-36.00*
Cast iron borings	*35.00-36.00*
Cut structurals, 3 ft. lengths	*51.00-52.00*
Cut structurals, 2 ft. and under	*52.00-53.00*
Heavy turnings	*41.00-42.00*
Punchings & plate scrap	*51.00-52.00*
Electric furnace bundles	*51.00-52.00*

Cast Iron Grades

No. 1 cupola	44.00-45.00
Heavy breakable cast	42.00-43.00
Unstripped motor blocks	34.00-35.00
No. 1 machinery cast	51.00-52.00

Railroad Scrap

No. 1 R.R. heavy melt.	*47.00-48.00*
Rails, 2 ft and under	*66.00-67.00*
Rails, 18 in. and under	*67.00-68.00*
Rails, random lengths	*60.00-61.00*
Railroad specialties	57.00-58.00

Stainless Steel Scrap

18-8 bundles & solids	*275.00-300.00*
18-8 turnings	*175.00-200.00*
430 bundles & solids	*75.00-80.00*
430 turnings	*55.00-60.00*

CLEVELAND

No. 1 heavy melting	38.00-39.00
No. 1 factory bundles	44.50-45.50
No. 2 heavy melting	36.00-37.00
No. 1 bundles	38.00-39.00
No. 2 bundles	32.00-33.00
No. 1 busheling	38.00-39.00
Machine shop turnings	20.00-21.00
Short shovel turnings	23.00-24.00
Mixed borings, turnings	23.00-24.00
Cast iron borings	23.00-24.00
Cut foundry steel	43.00-44.00
Cut structurals, plates 2 ft and under	48.00-49.00
Low phos. punchings & plate	42.00-43.00
Alloy free, short shovel turnings	26.00-27.00
Electric furnace bundles	42.00-43.00

Cast Iron Grades

No. 1 cupola	48.00-49.00
Charging box cast	37.00-38.00
Heavy breakable cast	37.00-38.00
Stove plate	44.00-45.00
Unstripped motor blocks	30.00-31.00
Brake shoes	37.00-38.00
Clean auto cast	47.00-48.00
Burnt cast	35.00-36.00
Drop broken machinery	50.00-51.00

Railroad Scrap

No. 1 R.R. heavy melt.	*48.00-49.00*
R.R. malleable	53.00-54.00
Rails, 2 ft and under	66.00-67.00
Rails, 18 in. and under	67.00-68.00
Rails, random lengths	61.00-62.00
Cast steel	55.00-56.00
Railroad specialties	59.00-60.00
Uncut tires	58.00-59.00
Angles, splice bars	59.00-60.00
Rails, rerolling	67.00-68.00

Stainless Steel
(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	310.00-320.00
18-8 turnings	210.00-220.00
430 clips, bundles, solids	75.00-80.00
430 turnings	40.00-50.00

YOUNGSTOWN

No. 1 heavy melting	41.00-42.00
No. 2 heavy melting	38.00-39.00
No. 1 bundles	41.00-42.00
No. 2 bundles	35.00-36.00
No. 1 busheling	41.00-42.00
Machine shop turnings	20.00-21.00
Short shovel turnings	23.00-24.00
Cast iron borings	23.00-24.00
Low phos.	45.00-46.00
Electric furnace bundles	45.00-46.00

Railroad Scrap

No. 1 R.R. heavy melt.	*49.00-50.00*

CHICAGO

No. 1 hvy melt, indus.	40.00-41.00
No. 1 hvy melt, dealer	38.00-39.00
No. 2 heavy melting	35.00-36.00
No. 1 factory bundles	44.00-45.00
No. 1 dealer bundles	39.00-40.00
No. 2 bundles	32.00-33.00
No. 1 busheling, indus	40.00-41.00
No. 1 busheling, dealer	38.00-39.00
Machine shop turnings	23.00-24.00
Mixed borings, turnings	25.00-26.00
Short shovel turnings	25.00-26.00
Cast iron borings	25.00-26.00
Cut structurals, 3 ft	46.00-47.00
Punchings & plate scrap	47.00-48.00

Cast Iron Grades

No. 1 cupola	39.00-40.00
Stove plate	34.00-35.00
Unstripped motor blocks	29.00-30.00
Clean auto cast	44.00-45.00
Drop broken machinery	44.00-45.00

Railroad Scrap

No. 1 R.R. heavy melt.	46.00-47.00
R.R. malleable	53.00-54.00
Rails, 2 ft and under	*59.00-60.00*
Rails, 18 in. and under	57.00-58.00
Angles, splice bars	53.00-54.00
Rails, rerolling	56.00-57.00

Stainless Steel Scrap

18-8 bundles & solids	*320.00-330.00*
18-8 turnings	*220.00-230.00*
430 bundles & solids	75.00-80.00
430 turnings	50.00-55.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*35.00-36.00*
No. 2 heavy melting	*26.00-27.00*
No. 1 bundles	*36.00-37.00*
No. 2 bundles	*25.00-26.00*
No. 1 busheling	*34.00-35.00*
Machine shop turnings	*23.00-24.00*
Mixed borings, turnings	*24.00-25.00*
Short shovel turnings	*24.00-25.00*
Punchings & plate scrap	*42.00-43.00*

Cast Iron Grades

No. 1 cupola	*45.00*
Charging box cast	38.00
Stove plate	*41.00*
Heavy breakable	36.00
Unstripped motor blocks	*24.00*
Clean auto cast	47.00
Malleable	*52.00*

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	39.50
No. 2 heavy melting	37.00
No. 1 bundles	39.50
No. 2 bundles	32.00
No. 1 busheling	39.50
Machine shop turnings	24.00
Short shovel turnings	*27.00*

Cast Iron Grades

No. 1 cupola	43.00
Charging box cast	35.00
Heavy breakable cast	35.00
Unstripped motor blocks	35.00
Brake shoes	40.00
Clean auto cast	48.00
Stove plate	39.00

Railroad Scrap

No. 1 R.R. heavy melt.	*43.50*
Rails, 18 in. and under	*58.00*
Rails, rerolling	*59.00*
Rails, random lengths	*53.00*
Angles, splice bars	*53.50*

PHILADELPHIA

No. 1 heavy melting	*49.00*
No. 2 heavy melting	*41.00*
No. 1 bundles	*49.00*
No. 2 bundles	*39.00*
No. 1 busheling	48.00-49.00
Electric furnace bundles	51.00
Mixed borings, turnings	32.00-33.00
Short shovel turnings	*36.50-37.50*
Machine shop turnings	*33.50*
Heavy turning	*45.00*
Structural & plate	51.00-53.00
Couplers, springs, wheels	*nom.*
Rail crops, 2 ft & under	65.00-66.00

Cast Iron Grades

No. 1 cupola	42.00-44.00
Heavy breakable cast	54.00
Malleable	*62.00†*
Drop broken machinery	*54.00-56.00*

†Nominal

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	43.00-44.00
No. 2 heavy melting	33.00-34.00
No. 1 bundles	43.00-44.00
No. 2 bundles	30.00-31.00
Machine shop turnings	23.00-24.00
Mixed borings, turnings	*27.00-28.00*
Short shovel turnings	*28.00-29.00*
Low phos. (structurals & plate)	46.00-47.00

Cast Iron Grades

No. 1 cupola	41.00-42.00
Unstripped motor blocks	32.00-33.00
Heavy breakable	45.00-46.00

Stainless Steel

18-8 sheets, clips solids	*315.00*
18-8 borings, turnings	*210.00-215.00*
430 sheets, clips, solids	60.00-70.00
410 sheets, clips, solids	50.00-60.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*35.00-35.50*
No. 2 heavy melting	*29.50-31.00*
No. 1 bundles	*35.00-35.50*
No. 2 bundles	*26.00-27.00*
No. 1 busheling	*35.00-35.50*
Machine shop turnings	20.00-20.50
Mixed borings, turnings	*22.50-23.50*
Short shovel turnings	*23.50-24.50*
No. 1 cast	34.00-35.00
Mixed cupola cast	33.00-34.00
No. 1 machinery cast	42.00-43.00

BUFFALO

No. 1 heavy melting	*40.00-41.00*
No. 2 heavy melting	*36.00-37.00*
No. 1 bundles	*40.00-41.00*
No. 2 bundles	*33.00-34.00*
No. 1 busheling	*40.00-41.00*
Mixed borings, turnings	29.00-30.00
Machine shop turnings	27.00-28.00
Short shovel turnings	30.00-31.00
Cast iron borings	29.00-30.00
Low phos.	*44.00-45.00*

Cast Iron Grades
(F.o.b. shipping point)

No. 1 cupola	39.00-40.00
No. 1 machinery	44.00-45.00

Railroad Scrap

Rails, random lengths	53.00-54.00
Rails, 3 ft and under	59.00-60.00
Railroad specialties	47.00-48.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	37.00-38.00
No. 2 heavy melting	33.00-34.00
No. 1 bundles	37.00-38.00
No. 2 bundles	30.00-31.00
No. 1 busheling	37.00-38.00
Machine shop turnings	25.00-26.00
Mixed borings, turnings	23.00-24.00
Short shovel turnings	27.00-28.00
Cast iron borings	23.00-24.00
Low phos. 18 in.	49.00-50.00

Cast Iron Grades

No. 1 cupola	43.00-44.00
Heavy breakable cast	42.00-43.00
Charging box cast	42.00-43.00
Drop broken machinery	55.00-56.00

Railroad Scrap

No. 1 R.R. heavy melt.	41.00-42.00
Rails, 18 in. and under	64.00-65.00
Rails, random lengths	54.00-55.00

BIRMINGHAM

No. 1 heavy melting	37.00-38.00
No. 2 heavy melting	31.00-32.00
No. 1 bundles	37.00-38.00
No. 2 bundles	26.00-27.00
No. 1 busheling	37.00-38.00
Cast iron borings	26.00-27.00
Short shovel turnings	29.00-30.00
Machine shop turnings	27.00-28.00
Bar crops and plate	46.00-47.00
Structurals & plate	44.00-45.00
Electric furnace bundles	43.00-44.00
Electric furnace:	
3 ft and under	41.00-42.00
2 ft and under	42.00-43.00

(F.o.b. shipping point)
Cast Iron Grades

No. 1 cupola	47.50-48.50
Stove plate	47.00-48.00
Unstripped motor blocks	38.00-39.00
Charging box cast	34.00-35.00
No. 1 wheels	37.00-38.00

Railroad Scrap

No. 1 R.R. heavy melt.	39.00-40.00
Rails, 18 in. and under	*55.00-56.00*
Rails, rerolling	59.00-60.00
Rails, random lengths	48.00-49.00
Angles, splice bars	52.00-53.00

SEATTLE

No. 1 heavy melting	48.00
No. 2 heavy melting	45.00
No. 1 bundles	45.00
No. 2 bundles	*26.00-28.00*
Machine shop turnings	*28.00-30.00*
Mixed borings, turnings	*28.00-30.00*
Electric furnace No. 1	*56.00*

Cast Iron Grades

No. 1 cupola	50.00
Heavy breakable cast	48.00
Unstripped motor blocks	40.00
Stove plate (f.o.b. plant)	42.00

LOS ANGELES

No. 1 heavy melting	*46.00*
No. 2 heavy melting	43.00
No. 1 bundles	47.00
No. 2 bundles	33.00
Machine shop turnings	*32.00*
Shoveling turnings	*33.00*
Cast Iron borings	34.00
Cut structural and plate, 1 ft and under	*57.00*

Cast Iron Grades
(F.o.b. shipping point)

No. 1 cupola	54.00

Railroad Scrap

No. 1 R.R. heavy melt	*48.00*

SAN FRANCISCO

No. 1 heavy melting	48.00
No. 2 heavy melting	43.00
No. 1 bundles	47.00
No. 2 bundles	35.00
Machine shop turnings	32.00
Mixed borings, turnings	32.00
Cast iron borings	32.00
Heavy turnings	32.00
Short shovel turnings	34.00
Cut structurals, 3 ft	60.00

Cast Iron Grades

No. 1 cupola	*55.00*
Charging box cast	47.00-49.00
Stove plate	48.00
Heavy breakable cast	42.00
Unstripped motor blocks	50.00
Clean auto cast	57.00
No. 1 wheels	50.00
Drop broken machinery	*55.00*

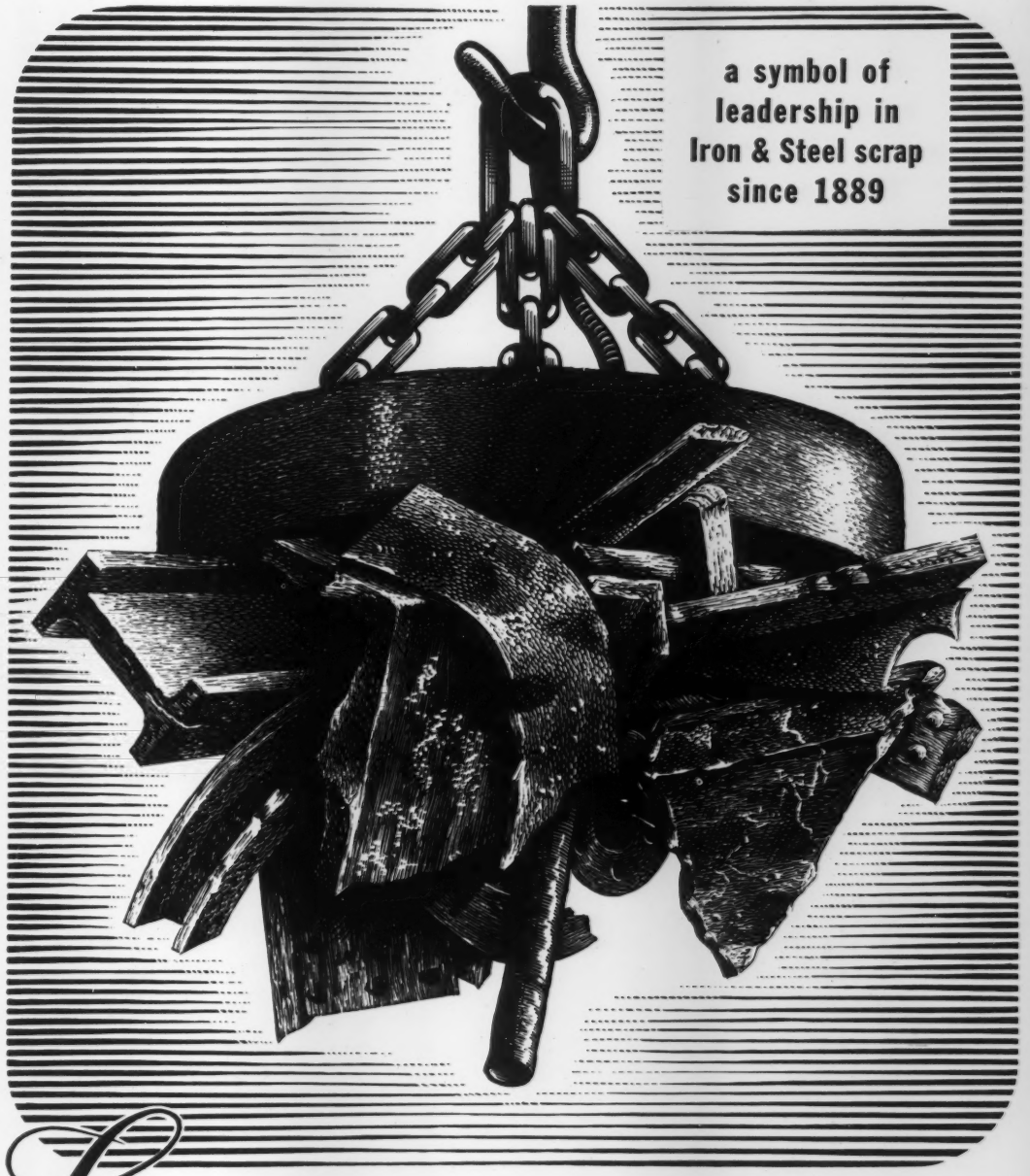
HAMILTON, ONT.

No. 1 heavy melting	43.00
No. 2 heavy melting	38.00
No. 1 bundles	43.00
No. 2 bundles	32.00
Mixed steel scrap	35.00
Mixed borings, turnings	19.00
Busheling, new factory:	
Prepared	43.00
Unprepared	37.00
Short steel turnings	30.00
Rails, rerolling	49.00

Cast Iron Grades†

No. 1 machinery cast	50.00

F.o.b. Hamilton, Ont.



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Price of Zinc Tumbles

Producers will try to hold the line at 12 cents a pound. Lead may be cut next—possibly to 14 cents a pound. Nickel shortage appears over for a while

Nonferrous Metal Prices, Pages 216 & 217

THE ZINC industry studied the business box score last week—automotive production off, appliances in a slump, the government's barter program (trading agricultural surplus for foreign origin lead and zinc) temporarily delayed.

Result: Domestic producers and custom smelters reduced the price of zinc to 12 cents a pound. It had been quoted at 13.50 cents since the first week in January, 1956. By taking a severe slash, the industry hoped to stimulate new market interest. Another unspoken aim—it may force some curtailment of world zinc production.

Users, following normal reaction, backed away to see what might happen next. Industry observers expect the price of lead to drop. They feel this might cause a further price decline in zinc.

Barter—The importance of the barter program is shown by the fact that the government took about 96,000 tons of lead and some 168,000 tons of zinc off foreign markets from July, 1956, through March, 1957. The Office of Defense Mobilization contends it will keep stockpile purchases of both metals on a month by month basis.

Fly in the ointment: Will an economy minded Congress keep ODM supplied with the necessary funds to make stockpile purchases?

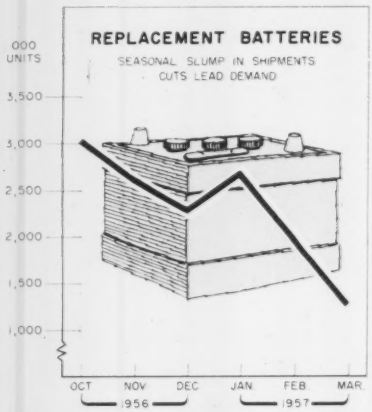
Outlook: The price of lead should tumble, perhaps to 14 cents a pound. Look for zinc producers to go all out to hold the price at 12 cents.

Mag Plant for Sale

The government's magnesium facility at Velasco, Tex., was put up for grabs last week.

Dow Chemical Co., Midland, Mich., bid $19,370,000. It already owns the power station and the property and has been leasing the plant from the General Services Administration.

The Velasco Magnesium Corp. (the name was taken to cover an interested group of investors) bid $16 million. While GSA could look at the bids and accept the high offer, don't be surprised if the lower one takes away the prize. Reason: The Justice department will have a strong interest in seeing that another producer enters the field if it is at all possible. Dow is currently the only producer of magnesium. It will be joined by a Brook & Perkins Inc. subsidiary (Alabama Metallurgical Corp.), which expects to be the second magnesium maker this year.



With its reams of background material, Justice may surmise that it would be better to take less money in the interest of diversifying the magnesium industry. If the west coast-backed investment group should get the facility, it would then have to negotiate with Dow for power and property.

Nickel Skies Bright

The government's deferral of all nickel stockpile deliveries for the second half combined with the leveling of business activity is virtually wiping out the nickel shortage. While it may be only for a short time, platemakers report that stainless clad plate is on eight-week delivery schedules because larger amounts of nickel anodes are being made available to the steel industry. The government's Nicaro, Cuba, facilities will reach the 25,000-ton annual production mark at midyear. This means that at least an extra 500 tons (sinter and metallic nickel) are being made available to industry.

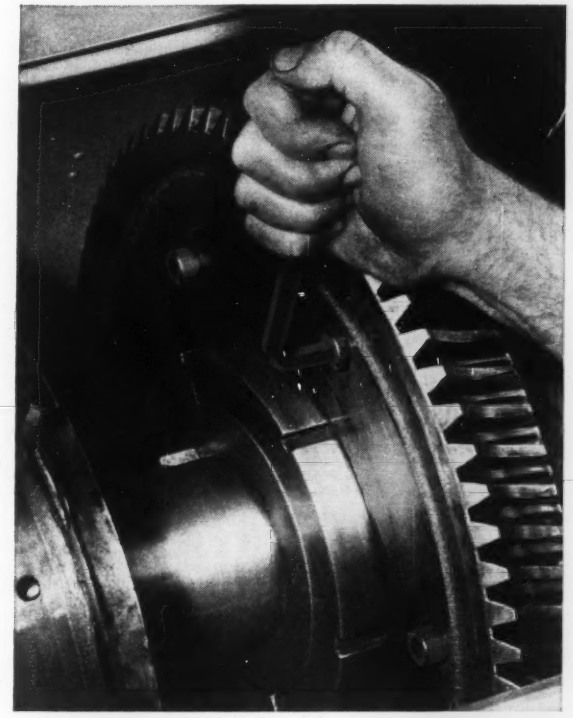
Market Memo

• Charles R. Cox, president, Kennecott Copper Corp., told stockholders: "Copper sales in the first three months of 1957 were 144,713 tons, compared with 134,802 during the first quarter of last year. Domestic sales were substantially less, but this decrease was more than offset by the increase in our foreign business."

NONFERROUS PRICE RECORD

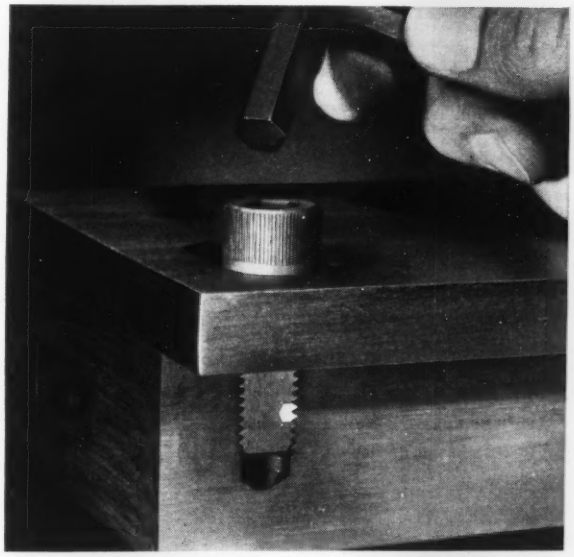
	Price May 8	Last Change	Previous Price	Apr. Avg.	Mar. Avg.	May, 1956 Avg.
Aluminum	27.10	Aug. 10, 1956	25.90	27.100	27.100	25.900
Copper	30.50–32.00	May 2, 1957	31.00–32.00	31.598	31.462	45.096
Lead	15.80	Jan. 13, 1956	16.30	15.800	15.800	15.800
Magnesium	35.25	Aug. 13, 1956	33.75	35.250	35.250	33.750
Nickel	74.00	Dec. 6, 1956	64.50	74.000	74.000	64.500
Tin	98.375	May 7, 1957	98.625	99.276	99.683	97.024
Zinc	12.00	May 6, 1957	13.50	13.500	13.500	13.500

Quotations in cents per pound based on: COPPER, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary ingots, 99 + %, deld.; MAGNESIUM, pig, 99.8%, Velasco, Tex.



The ordinary fasteners securing the worm wheel to the drum shaft in this automatic screw machine loosened, causing $120 worth of damage to parts. Labor for the repair job cost $100. The ordinary fasteners were replaced with self-locking UNBRAKOS, and there has been no trouble since.

Vibration won't loosen self-locking UNBRAKO socket cap screws



HOW IT LOCKS. The tough, resilient Nylok locking pellet keys itself into the mating threads. It forces threads together and locks the screw securely—whether or not the screw is seated.

UNBRAKO socket screws with the Nylok* self-locking device eliminate fastener problems caused by vibration.

Take the drive system in the automatic screw machine illustrated above, for example. The screws originally used to secure the worm wheel to the drum shaft loosened, causing considerable damage, besides loss of production time. These have now been replaced with self-locking UNBRAKO socket head cap screws and the trouble has been eliminated.

An UNBRAKO socket screw with the Nylok self-locking device is a single unit. Just screw it into any tapped hole. Seated or not, it locks positively wherever wrenching stops. Constant vibration or endless running of a machine won't affect these self-locking UNBRAKOS. The screws will not work loose!

Write today for your copy of Form 2193, which gives catalog and technical data on the complete line of UNBRAKO socket screws with the Nylok self-locking device. Or see your local industrial distributor. Unbrako Socket Screw Division, STANDARD PRESSED STEEL CO., Jenkintown 33, Pa.

UNBRAKO® SOCKET SCREW DIVISION

STANDARD PRESSED STEEL CO.

SPS

JENKINTOWN PENNSYLVANIA

*T.M. Reg. U.S. Pat. Off., The Nylok Corporation

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99+%, ingots, 27.10; pigs, 25.00, 10,000 lb or more, f.o.b. shipping point. Freight allowed on 500 lb or more.

Aluminum Alloy: No. 13, 28.90; No. 43, 28.70; No. 195, 30.30; No. 241, 30.50; No. 356, 28.90, 30-lb ingots.

Antimony: R.M.M. brand, 99.5%, 33.00; Lone Star brand, 33.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 27.50-28.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97%, lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $74.75 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.25% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.70 per lb deld.

Cobalt: 97-99%, $2.35 per lb for 550-lb keg; $2.37 per lb for 100-lb case; $2.42 per lb under 100 lb.

Columbium: Powder, $119.20 per lb, nom.

Copper: Electrolytic, 32.00 deld. Conn. valley; 32.00 deld. Midwest; custom smelters, 30.50 deld.; lake, 32.00 deld.; fire refined, 31.75 deld.

Germanium: First reduction $201.85-220 per lb; intrinsic grade, $220-242.67 per lb, depending on quantity.

Gold: U.S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $100-110 nom. per troy oz.

Lead: Common, 15.80; chemical, 15.90; corroding, 15.90, St. Louis, New York basis, add 0.20.

Lithium: 98+%, cups or ingots, $11.50; rod, $13.50; shot or wire, $14.50, f.o.b. Minneapolis, 100 lb lots.

Magnesium: Pig, 35.25; ingot, 36.00, f.o.b. Velasco, Tex., 13 in. sticks, 59.00, f.o.b. Madison, Ill.

Magnesium Alloys: AZ91B (diecasting), 37.25 deld.; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $255-257 per 76-lb flask.

Molybdenum: Extruded ingot, $9.60 per pound, f.o.b. Detroit.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot or ingots for addition to cast iron, 74.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01.

Osmium: $80-100 per troy oz, nom.

Palladium: $23-24 per troy oz.

Platinum: $92-95 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $118-125 per troy oz.

Ruthenium: $45-55 per troy oz.

Selenium: 99.5%, $12-15 per lb.

Silver: Open market, 91.375 per troy oz.

Sodium: 16.50, c.l.; 17.00, l.c.l.

Tantalum: Sheet, rod, $68.70 per lb; powder, $56.63 per lb.

Tellurium: $1.65 per lb.

Thallium: $12.50 per lb.

Tin: Straits, N.Y., spot and prompt, 98.375.

Titanium: Sponge, 99.3+%, grade A-1 ductile (0.3% Fe max.), $2.75; grade A-2 (0.5% Fe max.), $2.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $4.00 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00; 99+% hydrogen reduced, $4.75.

Zinc: Prime Western, 12.00; brass special, 12.25; intermediate, 12.50; East St. Louis, freight allowed over 0.50 per lb. New York basis, add 0.50. High grade, 13.35; special high grade, 13.75 deld. Die casting alloy ingot No. 3, 16.00; No. 2, 17.00; No. 5, 16.50 deld.

Zirconium: Ingots, commercial grade, $14.40 per lb; low-hafnium reactor grade, $23.07. Sponge, commercial grade, $10 per lb; reactor grade, $14-22 per lb depending on quantity. Powder electronics grades, $15 per lb; flash grade, $11.50.

(Note: Chromium, manganese and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 23.00-28.75; No. 12 foundry alloy (No. 2 grade), 21.00-22.50; 5% silicon alloy, 0.60 Cu max., 24.00-25.00; 13 alloy, 0.60 Cu max., 24.00-25.00; 195 alloy, 23.75-25.75; 108 alloy, 21.50-22.50. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 22.75; grade 2, 21.00; grade 3, 20.00; grade 4, 19.25.

Brass Ingot: Red brass, No. 115, 31.50; tin bronze, No. 225, 40.50; No. 245, 35.50; high-leaded tin bronze, No. 305, 35.50; No. 1 yellow, No. 405, 25.25; manganese bronze, No. 421, 28.50.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.50; AZ91C, 37.50; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.83-1.86, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.80, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 30,000-lb lots, 37.355; l.c.l., 37.98. Weatherproof, 30,000-lb lots, 37.78; l.c.l., 38.53. Magnet wire deld., 15,000 lb or more, 44.68; l.c.l., 45.43.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $21.50 per cwt; pipe, full coils, $21.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheets and strip, $11.00-14.75; sheared mill plate, $9.25-11.25; wire, $8.50-11.00; forging billets, $6.85-7.10; hot-rolled and forged bars, $7.10-7.35.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 24.00; ribbon zinc in coils, 21.00; plates, 19.50.

ZIRCONIUM

Plate, $20.35; H.R. strip, $23.95; C.R. strip, $32.00; forged or H.R. bars, $18.40; wire, 0.015 in., 8.00c per linear foot.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	126	106	128
Strip, C.R.	124	108	138
Plate, H.R.	120	105	121
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

Sheet and Circles: 1100 and 3003 mill finish (30,000 lb base; freight allowed).

Thickness Range Inches	Flat Sheet	Coiled Sheet
0.249-0.138	40.90-45.40	....
0.135-0.096	41.40-46.50	37.70-39.60
0.095-0.077	42.10-48.30	37.80-39.80
0.076-0.061	42.70-50.60	38.20-40.50
0.060-0.048	43.40-52.90	38.80-41.50
0.047-0.038	43.90-55.60	38.60-42.90
0.037-0.030	44.30-50.00	40.40-44.70
0.029-0.024	44.90-52.40	41.00
0.023-0.019	45.80-52.20	42.00
0.018-0.017	46.50-53.30	42.60
0.016-0.015	47.50-53.90	43.40
0.014	48.50-50.90	44.40
0.013-0.012	49.70-52.10	45.10
0.011	50.70-53.70	46.30
0.010-0.0095	52.10-54.40	47.60
0.009-0.0085	53.40	49.10
0.008-0.0075	55.00	50.03
0.007	56.50	51.80
0.006	58.10	53.20

ALUMINUM (continued)

Plates and Circles: Thickness 0.250-3 in., 24-60 in. width or diam., 72-240 in. lengths.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	40.2	44.5
5050-F	41.3	45.6
3004-F	42.3	47.5
5052-F	42.9	48.2
6061-T6	44.4	50.0
2024-T4*	48.1	54.4
7075-T6*	55.4	62.5

*24-48 in. width or diam., 72-180 lengths.

Screw Machine Stock: 30,000 lb base.

Diam. (in.) or across flats	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
Drawn				
0.125	74.30	71.50	....	....
0.156-0.172	63.00	60.40	....	....
0.188	63.00	60.40	....	76.40
0.219-0.234	59.70	57.20	....	....
0.250-0.281	59.70	57.20	....	73.00
0.313	59.70	57.20	....	69.60
0.344	58.50	....	....	....
Cold-Finished				
0.375-0.547	58.80	57.50	70.10	65.50
0.563-0.688	58.80	57.50	66.70	61.60
0.750-1.000	57.40	56.00	61.00	58.10
1.063	57.40	56.00	....	56.10
Rolled				
1.125-1.500	55.20	53.90	59.00	56.10
1.563	53.70	52.40	....	....
1.625-2.000	53.10	51.60	....	....
2.125-2.500	51.70	50.30	....	....
2.563-3.375	50.20	48.70	....	....

Forging Stock: Round, Class 1, 43.30-55.90 in specific lengths, 36-144 in., diam. 0.375-8 in. Rectangles and squares, Class 1, 48.10-63.20 in random lengths, 0.375-4 in. thick, width 0.0750-10 in.

Pipe: ASA schedule 40, alloy 6063-T6, standard lengths, plain ends, 90,000-lb base, per 100 ft.

Nom. Pipe Size (in.)		Nom. Pipe Size (in.)	
¾	$18.45	2	$ 57.00
1	29.00	4	157.20
1¼	39.25	6	281.65
1½	46.95	8	423.80

Extruded Solid Shapes:

Factor	Alloy 6063-T5	Alloy 6062-T6
9-11	43.10-44.60	57.80-61.80
12-14	43.40-44.80	58.40-62.70
15-17	43.60-45.40	59.60-64.30
18-20	44.10-45.80	61.50-66.80

MAGNESIUM

Sheet and Plate: AZ31B standard grade, 0.32 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.0 in., 67.90. AZ31B spec. grade, .032 in., 171.30; .081 in., 108.70; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Thread plate, .188 in., 71.70; .250-2.00 in., 70.60. Tooling plates, .250-3.0 in., 73.0.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	69.60-72.40	84.60-87.40
12-14	70.70-73.00	85.70-88.00
24-26	75.60-76.30	90.60-91.30
36-38	89.20-90.30	104.20-105.30

NONFERROUS SCRAP

DEALER'S BUYING PRICES

(Cents per pound, New York, in ton lots.)

Aluminum: 1100 clippings, 13.00-13.50; old sheets, 9.00-9.50; borings and turnings, 6.00-

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES f		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tube	Clean Heavy	Rod Ends	Clean Turnings
Copper	54.13b	51.36c	....	54.32	28.000	28.000	27.250
Yellow Brass	47.52	35.69d	48.06	50.43	21.875	21.625	20.125
Low Brass, 80%	50.20	50.14	50.74	53.01	24.250	24.000	23.500
Red Brass, 85%	51.14	51.08	51.68	53.95	25.000	24.750	24.250
Com. Bronze, 90%	52.63	52.57	53.17	55.19	25.875	25.625	25.125
Manganese Bronze	55.43	49.53	59.77	....	20.500	20.250	19.750
Muntz Metal	49.79	45.60	....	....	20.750	20.500	20.000
Naval Brass	51.69	46.00	58.75	55.10	20.500	20.250	19.750
Silicon Bronze	58.60	57.79	58.64	60.68e	27.375	27.125	26.375
Nickel Silver, 10%	64.06	66.39g	66.39	....	28.250	28.000	14.125
Phos. Bronze, A-5%	73.17	73.67	73.67	74.85	28.875	28.625	27.625

a. Cents per lb, f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. 3% silicon. f. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb. g. Leaded

6.50; crankcases, 9.00-9.50; industrial castings, 9.00-9.50.

Copper and Brass: No. 1 heavy copper and wire, 24.00-24.50; No. 2 heavy copper and wire, 22.50-23.00; light copper, 20.50-21.00; No. 1 composition red brass, 21.00-21.50; No. 1 composition turnings, 20.50-21.00; yellow brass turnings, 12.00-12.75; new brass clippings, 19.00-19.50; light brass, 12.00-12.50; heavy yellow brass, 14.50-15.00; new brass rod ends, 16.50-17.00; auto radiators, unsweated, 15.50-16.00; cocks and faucets, 16.50-17.00; brass pipe, 17.00-17.50.

Lead: Heavy, 11.75-12.50; battery plates, 6.25-6.75; linotype and stereotype, 13.00-14.00; electrotype, 12.50-13.00; mixed babbitt, 12.00-13.50.

Monel: Clippings, 50.00-55.00; old sheets, 50.00-55.00; turnings, 45.00-50.00; rods, 50.00-55.00.

Nickel: Sheets and clips, 85.00-100.00; rolled anodes, 85.00-100.00; turnings, 75.00-80.00; rod ends, 85.00-100.00.

Zinc: Old zinc, 3.00-3.50; new die-cast scrap, 3.00-3.50; old die-cast scrap, 1.75-2.00.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Aluminum: 1100 clippings, 16.50; 3003 clippings, 16.50; 6151 clippings, 16.50; 5052 clippings, 16.00-16.50; 2014 clippings, 15.50-16.00; 2017 clippings, 15.50-16.00; 2024 clippings, 15.50-16.00; mixed clippings, 15.00; old sheets, 13.00-13.50; old cast, 13.00-13.50; clean old cable (free of steel), 15.50-16.50; borings and turnings, 13.50-14.50.

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 54.00; light scrap, 49.00; turnings and borings, 34.00.

Copper and Brass: No. 1 heavy copper and wire, 26.75; No. 2 heavy copper and wire, 24.75; light copper, 22.50; refinery brass (60% copper) per dry copper content, 24.25.

INGOTMAKERS' BUYING PRICES

(Cents per pound, carlots, delivered)

Copper and Brass: No. 1 heavy copper and wire, 26.75; No. 2 heavy copper and wire, 24.75; light copper, 22.50; No. 1 composition borings, 23.00; No. 1 composition solids, 23.50; heavy yellow brass solids, 17.50; yellow brass turnings, 16.50; radiators, 18.00.

PLATING MATERIALS

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.70 per lb.

Copper: Flat-rolled, 50.29; oval, 49.42, 5000-10,000 lb; electrodeposited, 39.25, 2000-5000 lb lots; cast, 44.00, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, 101.50; 100-499 lb, 99.50; 500-4999 lb, 95.50; 5000-29,999 lb, 93.50; 30,000 lb, 91.50. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 117.50; 200-499 lb, 116.00; 500-999 lb, 115.50; 1000 lb or more, 115.00.

Zinc: Balls, 18.59; flat tops, 18.25; flats, 22.75; ovals, 22.00, ton lots.

CHEMICALS

Cadmium Oxide: $1.70 per lb, in 100-lb drums.
Chromic Acid: 100 lb, 33.30; 500 lb, 32.80; 2000 lb, 32.15; 5000 lb, 31.80; 10,000 lb, 31.30, f.o.b. Detroit.

Copper Cyanide: 100-1000 lb, 77.50.

Copper Sulphate: 100 lb, 24.35; 200 lb, 21.35; 300 lb, 20.35; 400 lb, 19.85; 500 lb, 18.35; 2000 lb, 16.10; 6000 lb, 15.85; 12,000 lb, 15.60, f.o.b. shipping point.

Nickel Chloride: 100 lb, 48.50; 200 lb, 46.50; 300 lb, 45.50; 400 lb, 43.50; 5000 lb, 41.50; 10,000 lb, 40.50.

Nickel Sulphate: 100 lb, 40.50; 200 lb, 38.50; 300 lb, 37.50; 400 lb, 35.50; 5000 lb, 33.50; 20,000 lb, 33.00; 36,000 lb, 32.50.

Sodium Cyanide: 100 lb, 27.50; 200 lb, 25.80; 400 lb, 22.80; 1000 lb, 21.80, f.o.b. Detroit.
Sodium Stannate: Less than 100 lb, 78.00; 100-600 lb, 68.80; 700-1900 lb, 66.00; 2000-9900 lb, 64.10; 10,000 lb or more, 62.80.

Stannous Chloride (anhydrous): Less than 25 lb, 167.70; 25 lb, 132.70; 100 lb, 117.70; 400 lb, 115.30; 5200-19,600 lb, 103.10; 20,000 lb, 90.90.

Stannous Sulphate: Less than 50 lb, 130.40; 50 lb, 100.40; 100-1900 lb, 98.40; 2000 lb or more, 96.40.

Zinc Cyanide: Under 1000 lb, 55.55; 1000 lb and over, 53.55.

(*Concluded from page* 211)

little early improvement.

There is mounting evidence that some steel mills will be forced to curtail blast furnace output in the next few months. Some blast furnaces have been operating for extended periods and need repairs. Another factor is reduction in open-hearth operation resulting in less call for hot metal and pig iron in steel plants.

U.S. Steel Corp. has blown out its No. 3 blast furnace at Youngstown for repairs. As soon as these are completed and the furnace is blown in, another furnace will be taken out for repairs.

CLASSIFIED ADVERTISING

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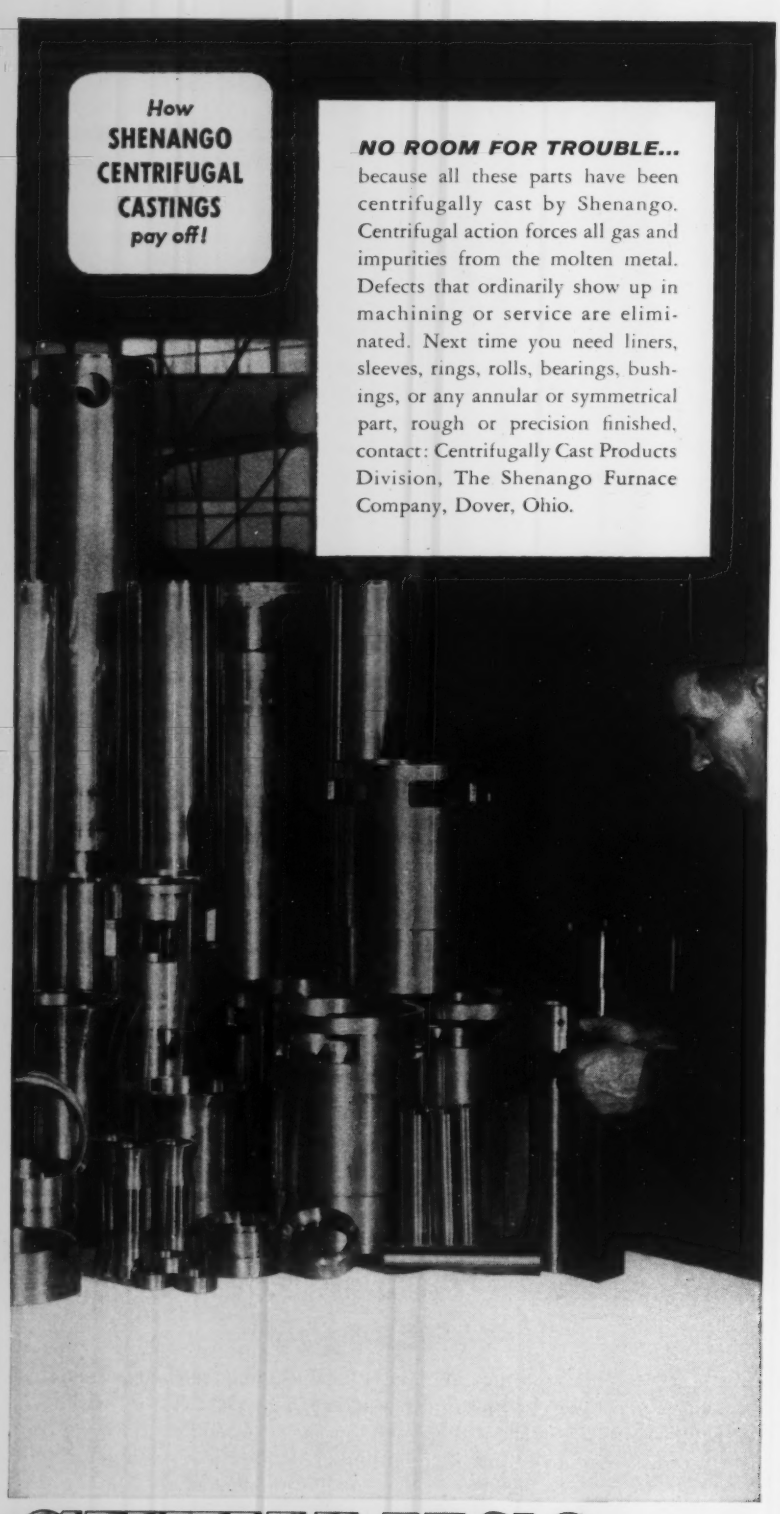
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Advertising Index

Acme Chain Corporation ... 88
Ajax Electric Co. ... 197
Allen Manufacturing Co. ... 45
Allis-Chalmers ... 175
Aluminium Limited Sales, Inc. ... 145
American Brass Co., The ... 190
American Metal Market ... 10
American Optical Co., Safety Products Division ... 22
American Smelting & Refining Co., Federated Metals Division ... 154, 155
American Steel & Wire Division, United States Steel Corporation ... 33
Armco Steel Corporation ... 66

Baldwin-Lima-Hamilton Corporation, Standard Steel Works Division ... 61
Barber-Colman Co. ... 40, 41
Basic, Inc. ... 65
Bearings, Inc. ... 149
Beatty Machine & Mfg. Co. ... 144
Behr-Manning Co., A Division of Norton Co. ... 13
Bethlehem Steel Co. ... 1, 220
Bishop, J., & Co. Platinum Works, Stainless Steel Products Division ... 200
Bliss, E. W., Co. ... 47
Browning, Victor R., & Co., Inc. ... 210
Buffalo Forge Co. ... 56
Bullard Co., The ... 82

Cadman, A. W., Mfg. Co. ... 209
Carborundum Co., The, Electro Minerals Division ... 55
Carlson, G. O., Inc. ... 101
Carpenter Steel Co., The ... 152, 153
Cattie, Joseph P., & Brothers, Inc. ... 210
Chambersburg Engineering Co. ... 18
Cincinnati Gear Co., The ... 16
Cincinnati Shaper Co., The ... 20, 21
Clark Equipment Co., Industrial Truck Division ... 54
Clemson Bros., Inc. ... 35
Cleveland Cap Screw Co., The ... 158
Cleveland Worm & Gear Co., The ... Inside Back Cover
Colorado Fuel & Iron Corporation, The ... 25
Columbia-Geneva Steel Division, United States Steel Corporation ... 33
Commercial Contracting Corporation ... 209
Continental Industrial Engineers, Inc. ... 193
Continental Tool Works, Division of Ex-Cell-O Corporation ... 6, 7
Copperweld Steel Co., Ohio Seamless Tube Division ... 118
Copperweld Steel Co., Steel Division ... 85
Corhart Refractories Co., Inc. ... 188
Crucible Steel Company of America ... 46
Cutler-Hammer, Inc. ... Back Cover

Danly Machine Specialties, Inc. ... 103
Disston, Henry, Division, H. K. Porter Company, Inc. ... 171
DoAll Co., The ... 106
Dodge Manufacturing Corporation ... 98, 99
Dresser Industries, Inc., Dresser Manufacturing Division ... 209
Dresser Industries, Inc., Roots-Connersville Blower Division ... 182

Electric Controller & Mfg. Co., The, A Division of The Square D Co. ... Inside Front Cover
Electro Metallurgical Co., A Division of Union Carbide & Carbon Corporation ... 8
Ex-Cell-O Corporation, Continental Tool Works Division ... 6, 7

Federal Machine & Welder Co., The ... 34
Federal-Mogul-Bower Bearings, Inc., Federal-Mogul Division ... 26
Federated Metals Division of American Smelting & Refining Co. ... 154, 155
Femco, Inc. ... 102
Fenn Manufacturing Co., The ... 100
Finkl, A., & Sons Co. ... 181
Fuller Co. ... 196

General Electric Co. 9, 27, 51
General Refractories Co. 195
General Steel Castings Corporation, National Roll & Foundry Division 179
Gerlinger Carrier Co. 44
Goodyear Tire & Rubber Co., Inc., The, Industrial Products Division 4
Great Lakes Carbon Corporation, Electrode Division 78

Hallden Machine Co., The 168
Hamilton Foundry & Machine Co., The 23
Hevi Duty Electric Co. 184
Heyl & Patterson, Inc. 11
Hill Acme Co., The 30
Horsburgh & Scott Co., The 12
Houghton, E. F., & Co. 57
Hunter Spring Co. 105
Hyde Park Foundry & Machine Co. 219

Ingersoll Milling Machine Co., The, Cutter Division 150
Inland Steel Co. 52, 53

Jessop Steel Co. 43
Johnson Steel & Wire Co., Inc. 58, 59
Jones & Lamson Machine Co. 131, 133, 135, 137, 139
Jones & Laughlin Steel Corporation 173
Jones & Laughlin Steel Warehouse Division, Jones & Laughlin Steel Corporation 38, 39

Kinnear Mfg. Co., The 162
Kling Bros. Engineering Works 3
Klockner Steel Products, Inc. 217
Koppers Co., Inc., Engineering & Construction Division 48, 49

Laminated Shim Co., Inc. 198
Leeds & Northrup Co. 24
Lewis Welding & Engineering Corporation, The, Welding Division 192
Luria Brothers & Co., Inc. 213

McKay Machine Co., The 77

Malleable Founders' Society 148
Manning, Maxwell & Moore, Inc., Shaw-Box Crane & Hoist Division 104
Marchant, Geo. F., Co. 194
Mathews Conveyer Co. 151
May-Fran Engineering, Inc. 186, 187
Michigan Steel Tube Products Co. 107
Micromatic Hone Corporation 176, 177
Monarch Machine Tool Co., The 172
Morse Twist Drill & Machine Co. 14, 15

National Acme Co., The 147
National Roll & Foundry Division, General Steel Castings Corporation 179
National Steel Corporation 31
National Tube Division, United States Steel Corporation 33
Nilson, A. H., Machine Co. 108
Norfolk & Western Railway 140
Norgren, C. A., Co. 17
Norton Co., Behr-Manning Co. Division 13

Ohio Seamless Tube Division of Copperweld Steel Co. 118

Peters-Dalton, Inc. 93
Pines Engineering Co., Inc. 42
Pittsburgh Engineering & Machine Co., Division of Pittsburgh Steel Foundry Corporation 129
Pittsburgh Steel Co. 58, 59
Porter, H. K., Company, Inc., Henry Disston Division 171
Porter, H. K., Company, Inc., Riverside-Alloy Metal Division 170

Potter & Johnston Co. 163, 165
Pratt & Whitney Co., Inc. 156, 157, 159, 161

Reading Crane & Hoist Corporation 89
Ready-Power Co., The 164
Reliance Electric & Engineering Co. 32
Remington Rand Division of Sperry Rand Corporation 117
Republic Steel Corporation 142, 143
Riverside-Alloy Metal Division, H. K. Porter Company, Inc. 170
Rockwell Manufacturing Co. 37
Roebling's, John A., Sons Corporation, A Subsidiary of The Colorado Fuel & Iron Corporation 25
Roll Formed Products Co. 217
Roots-Connersville Blower, A Division of Dresser Industries, Inc. 182
Rust-Oleum Corporation 60
Ryerson, Joseph T., & Son, Inc. 68

Salem-Brosius, Inc. 95
Sandvik Steel, Inc. 185
Service Steel 210
Sharon Steel Corporation 19
Shaw-Box Crane & Hoist Division, Manning, Maxwell & Moore, Inc. 104
Shenango Furnace Co., The, Centrifugally Cast Products Division 218
Silent Hoist & Crane Co. 160
SKF Industries, Inc. 2
Sperry Rand Corporation, Remington Rand Division 117
Square D Co., The, The Electric Controller & Mfg. Co. Division Inside Front Cover
Standard Pressed Steel Co., Unbrako Socket Screw Division 215
Standard Steel Works Division, Baldwin-Lima-Hamilton Corporation 61
Standard Tube Co., The 50

Tennessee Coal & Iron Division, United States Steel Corporation 33
Texas Co., The 62
Thomas Flexible Coupling Co. 178
Thomas Machine Manufacturing Co. 194
Timken Roller Bearing Co., The, Steel & Tube Division 86
Tinnerman Products, Inc. 90
Tomkins-Johnson Co., The 180
Towmotor Corporation 44
Transue & Williams 96

Union Carbide & Carbon Corporation, Electro Metallurgical Co. 8
United States Rubber Co., Mechanical Goods Division 127
United States Steel Corporation, Subsidiaries 28, 29, 33
United States Steel Export Co. 33
United States Steel Supply Division, United States Steel Corporation 28, 29, 33

Vollrath Co., The, Foundry Division 210

Weirton Steel Co. 31
Wendt-Sonis Co. 174
Wheelabrator Corporation 183
Wheelock, Lovejoy & Co., Inc. 146
Wheland Co., The 89
Wisconsin Motor Corporation 160

Youngstown Sheet & Tube Co., The 36

Table of Contents, Page 5

Classified Advertising, Page 217

Hyde Park

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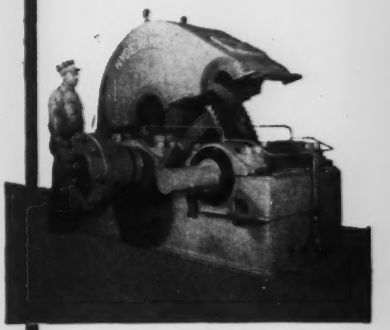
Gray Iron Castings

Hyde Park Castings up to 80,000 pounds are sound, accurate and physically dependable.
Precision machining is done by skilled craftsmen in our modern machine shop.
Send your blue prints for quotation.



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Machine Castings
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For finer finish, long life and greater tonnage, specify Red Circle Rolls.

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Hyde Park, Westmoreland County, Pa
ROLLS
ROLLING MILL MACHINERY
GREY IRON CASTINGS

Welding Plate Girder for New York City School

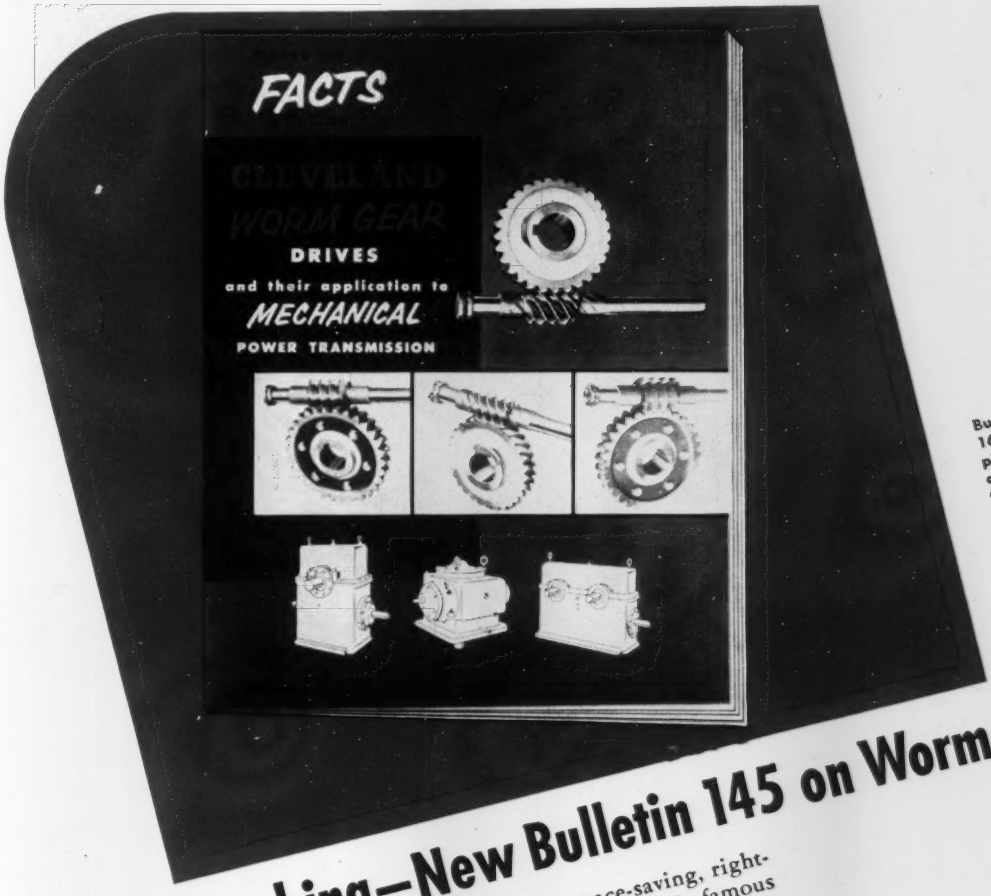
This 65-ft-long welded plate girder is shown being fabricated in the Allentown, Pa., shop of Lehigh Structural Steel Company for the new School of Printing in New York City. Made entirely from Bethlehem plate, the girder is 6 ft deep and weighs 10 tons. The flange plates are 2¼ in. thick, the webs ½ in. thick and the stiffeners ⅜ in. and ½ in. thick. The uniform quality of Bethlehem plates makes them ideally suited to weldment fabrication. The use of these plates, plus proper welding technique, gives assurance of sound welds every time. Bethlehem plates come in a full range of sheared and universal mill sizes.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL



Bulletin 145 gives you 16 fact-filled pages of photographs and data on standard and custom-designed worm gear speed reducers and worm gearing components for built-in drives.

Yours for asking—New Bulletin 145 on Worm Gearing

WHENEVER you want a safe, space-saving, right-angle drive, you specify Cleveland. This famous worm-gear drive transmits power uniformly, smoothly, dependably, under even the most severe operating conditions, for a lifetime of trouble-free service. Clevelands actually improve with use. Thousands of units outlast their driven machines.

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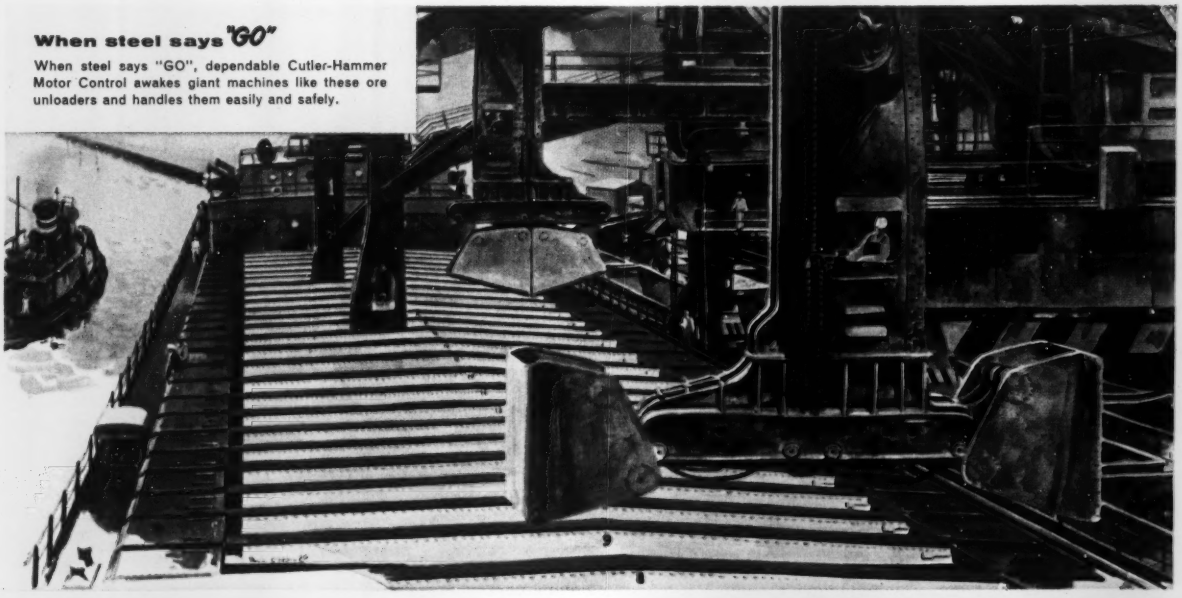
Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers, Limited.

Steel sets a stiff pace

When steel says "GO"

When steel says "GO", dependable Cutler-Hammer Motor Control awakes giant machines like these ore unloaders and handles them easily and safely.



When steel says "SLOW"

When steel says "SLOW", unseen but vital control units such as Cutler-Hammer resistors mounted far up on the crane assume a major role in safety.

When steel says "STOP"

Dependable Cutler-Hammer magnetic brakes are the outstanding choice of mill engineers for the many jobs where steel often says "STOP" and means it.

By its very nature, steel-making cannot tolerate delays. But it is also true that steel-making is tough on equipment, punishes it as few other jobs do. Tie these two facts together and it is easy to see that steel sets a stiff pace at any time. Tie them together under today's maximum mill schedules and you have the toughest trials mill equipment has ever been asked to survive.

This situation puts much meaning into the fact that more steel mills are now buying more Cutler-Hammer Motor Control than ever before in history. Today's operations not only require the utmost dependability in motor control but provide the conditions which most clearly reveal it.

When you require motor control, always remember Cutler-Hammer dependability is extra value at no extra cost. Insist on Cutler-Hammer; experienced engineers everywhere do. ' ' ' CUTLER-HAMMER, Inc., 1211 St. Paul Avenue, Milwaukee 1, Wisconsin. *Associate:* Canadian Cutler-Hammer, Ltd., Toronto.

Cutler-Hammer Three-Star Motor Control sets three new cost-cutting standards; installs easier, works better and lasts longer. Featured by leading machinery builders. Stocked for your convenience by your Cutler-Hammer Distributor.

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